National Aeronautics and Space Administration


# Chronology of KSC and KSC Related Events for 2011

*Elaine E. Liston*

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# FOREWORD

This 2011 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 compiled for publication by Archivist Elaine E. Liston.

Comments 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@nasa.gov, or (321) 867-1515.

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**January 3: USA to lay off 150 this week**

Lead space shuttle contractor United Space Alliance plans to lay off about 150 employees at Kennedy Space Center this week. The local layoffs, effective Friday, are the first of potentially several thousand this year as the Houston-based company undergoes a dramatic downsizing in preparation for the final shuttle flight. The timing of the upcoming cuts was not impacted by the delay in shuttle Discovery's flight from November until at least February due to technical problems. The affected employees were given 60 days notice and are eligible for severance packages based on their years of service and an additional "critical skills" bonus for some. The departures include both voluntary and involuntary layoffs; a breakdown was not immediately available. USA expects to have slightly fewer than 4,000 Florida employees after the upcoming layoffs, and about 6,500 companywide. Cuts will probably occur on a quarterly basis, but the timing and size will depend on the schedule for flying out the remaining shuttle missions. Endeavour is targeted to launch April 1 and Atlantis could fly over the summer, though that mission is not yet officially budgeted or included on the flight manifest. The biggest job losses will follow the final shuttle's return home. KSC's workforce now stands at about 13,200, including roughly 11,100 contractors and 2,100 civil servants. The most significant contractor cuts to date occurred Oct. 1, when USA let go nearly 900 employees and other companies trimmed another 200 positions. Web posted. (2011). [USA to lay off 150 this week [Online]. Available WWW: http://www.floridatoday.com/ [2011, January 3].]

**Study Could Leave Astronauts With Pink Slips**

NASA may have to get rid of some of its astronauts. A cut to the astronaut corps is under review. NASA has 63 astronauts, all of whom have flown in space. It has nine astronaut trainees who are hoping for their first flights, but it has no launches planned from the United States after the shuttle retires. After the Kennedy Space Center's last two or three launches, a federal panel is considering whether the agency really needs more than 70 astronauts. The astronauts of the 1960s had a chance to move onto Skylab and the shuttle, but now NASA has no other missions planned. Several astronauts have resigned recently. The report, from the National Academy of Sciences, is expected to be complete in several months. Web posted. (2011). [Study Could Leave Astronauts With Pink Slips [Online]. Available WWW: http://www.wesh.com/ [2011, January 3].]

**Discovery's tank to get reinforcement before flight**

Shuttle program managers today gave the go-ahead to proceed with some modifications to Discovery's external tank in preparation for a flight still targeted for early February. Technicians plan to reinforce 34 of the 108 structural support beams called "stringers" on the tank' mid-section, a handful of which were found to have cracked after a Nov. 5 launch attempt. The stringers being reinforced are located on two panels where solid rocket boosters connect to the intertank and are the ones subjected to the most stress during flight. They do not include the five stringers that have shown cracks, which are being repaired separately. The modification being implemented fastens a small strip of metal called a "radius block" to the tops of the stringers to limit the amount they flex. NASA expects the work to be completed within a week, preserving the option of launching Discovery during an eight-day window that opens Feb. 3. However, the next program meeting on Thursday will review more engineering analysis that could lead to a decision to reinforce the tops of all of the stringers. That would push Discovery's launch into the next window, which opens Feb. 27. Web posted. (2011). [Discovery's tank to get reinforcement before flight [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, January 3].]

**January 4: Space Florida Eyes More Launches with $48 Million DOD Contract**

Florida will be able to compete with spaceports across the country to launch satellites aboard ICBMs that will be decommissioned under the new Strategic Arms Reduction Treaty (START) between the United States and Russia. The Department of Defense has also given a $48 million contract to Space Florida to support *Minotaur* launches from Cape Canaveral. Pat McCarthy, Space Florida's Director of Spaceport Operations, said that the DOD has agreed to designate Cape Canaveral as one of the sites where converted ICBMs can be launched. Other sites include: Vandenberg AFB, California; Wallops Flight Facility, Virginia; Kodiak Launch Complex, Alaska; and the Reagan Test Site on Kwajalein Atoll in the U.S. Marshall Islands. Web posted. (2011). [Space Florida Eyes More Launches as Agency Receives $48 Million DOD Contract [Online]. Available WWW: http://www.parabolicarc.com/ [2011, January 4].]

**January 5: Bolden: third shuttle flight would be safe**

NASA Administrator Charlie Bolden today reiterated a commitment to fly a third shuttle mission this year and said the agency has determined the mission would be safe. The 2010 NASA Authorization Act requests the flight pending an assessment of its safety, which Bolden said is not yet final. Since no rescue shuttle would be available, the mission dubbed STS-135 would rely in Soyuz spacecraft to gradually return crew members from the International Space Station. Speaking at an AIAA conference in Orlando, Bolden, a four-time shuttle flyer, discussed the shuttle's "huge benefit to society" and sadness that the program was coming an end. But he said he was excited about efforts to build up a commercial capability to provide access to low Earth orbit for cargo and people, saying it would allow NASA to focus on a sustainable exploration program. Answering a question from the audience, Bolden offered assurance Kennedy Space Center and Cape Canaveral Air Force Station would remain the hub of human spaceflight for the foreseeable future. Web posted. (2011). [Bolden: third shuttle flight would be safe [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, January 5].]

**NASA To Meet Thursday About Potential Shuttle Modifications**

NASA managers will meet Thursday [January 6th] and talk about the possibility of additional modifications to shuttle Discovery's external tank, and any significant amount of extra work likely would push the orbiter's 39th and final flight back to Feb. 27 at the earliest. Discovery and six astronauts are tentatively scheduled to launch on Feb. 3, the opening of a seven-day opportunity to put the orbiter and its crew on course for a supply run to the International Space Station. The fleet leader's flight had been scheduled to launch in November. But NASA delayed the flight after discovering small cracks in support beams that stretch between the upper and lower parts of the 15-story propellant tank. NASA managers decided to roll the shuttle back to the Kennedy Space Center Vehicle Assembly Building for additional inspections. They subsequently ordered up modifications to 32 of the 108 support beams on the "intertank" region of the bullet-shaped vessel. Brackets that will strengthen the beams are to be put in place and then foam insulation will be reapplied. Engineers now think the problem might be related to a mottled metal alloy that was used to manufacture the beams. Cracks only have been found on beams made with the mottled alloy, and tests have shown it is weaker and more susceptible to defects than beams made with other material. Managers at a Program Control Review Board meeting will talk about whether additional beams on the tank should be shored up before Discovery is hauled back out to launch pad 39A. Rollout now is slated for mid-January. The next launch window will extend from Feb. 27 to March 6. Discovery's crew intends to deliver a permanent storage module to the station along with other critical supplies and equipment. The mission will be the 133rd for the shuttle program and the first of only two or three more flights remaining before fleet retirement. Endeavour is tentatively scheduled to launch to the station on April 1. Congress has authorized an additional mission that would fly aboard Atlantis this summer but money for the flight still must be appropriated. Web posted. (2011). [NASA To Meet Thursday About Potential Shuttle Modifications [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, January 5].]

**January 7: USAF EELV safe from Pentagon cuts**

In a plan that would ultimately cut billions from existing Pentagon programs, at least one space project is safe, according to US Secretary of Defense Robert Gates. The US Air Force's Evolved Expendable Launch Vehicle (EELV) program was among the projects Gates said would actually increase in procurement under his cost saving measures. The EELV is necessary to "to assure access to space for both military and other government agencies while sustaining our industrial base," the Pentagon says. Funds to speed up the procurement would come from trimming other air service programs, including consolidating two air operations centers in the US and two in Europe. The EELV, originally conceived in the 1990s, is replacing the US's legacy launch systems with two families of launch vehicles, common components and common infrastructure. Space-lift under the modernization project - which yielded the Boeing Delta IV and Lockheed Martin Atlas V - are an estimated 25 percent lower than launches with legacy Atlas, Delta and Titan space launch systems. Web posted. (2011). [USAF EELV safe from Pentagon cuts [Online]. Available WWW: http://www.flightglobal.com/ [2011, January 7].]

**Work on fuel tank pushes shuttle launch to late February**

Discovery won't launch before late February, as NASA continues investigating the cause of cracks on the shuttle's external tank and considers additional modifications intended to prevent more cracks. Kennedy Space Center teams already are preparing to bolster 32 structural support beams -- called stringers -- on the tank's mid-section, adding metal strips to add strength and limit how much they bend. Another 63 stringers are expected to get similar support, but shuttle program managers on Thursday deferred a decision until engineers can confirm all the changes won't produce any unintended consequences. The managers don't expect to be ready to launch the shuttle in the next available window from Feb. 3 to 10. The next opportunity is likely between Feb. 27 and March 6. "That first window in February is no longer available based on the amount of work that's left to be done and testing they would like to complete," said Kyle Herring, a shuttle program spokesman at Johnson Space Center in Houston. An official target launch date is expected to be discussed next Thursday. Senior NASA officials Monday morning will be briefed on the status of the tank modifications and ongoing tests to determine what caused the cracks in five stringers. The first of those was found after a Nov. 5 launch scrub, when a crack in the orange insulating foam covering the surface of the 15-story tank revealed a damaged stringer below. More cracks were found through scans that imaged the hardware below intact foam. The cracked components are being repaired and most of the rest of the 108 stringers are likely to be strengthened with the metal strips called "radius blocks." A handful of the stringers have been determined to be made of a stronger aluminum alloy that is not expected to require reinforcement. Discovery had been tentatively scheduled to roll back out to launch pad 39A late next week if the stringer work was concluded. Now, it appears early February is the soonest Discovery might make its move. The shuttle's 11-day mission to deliver a module to the International Space Station is one of two or three planned this year before the fleet is retired. Endeavour is targeted to fly April 1. If funding is secured, Atlantis would fly the final mission, possibly in late June. Web posted. (2011). [Work on fuel tank pushes shuttle launch to late February [Online]. Available WWW: http://www.floridatoday.com/ [2011, January 7].]

**USA lays off 143 KSC workers today**

United Space Alliance today is laying off 143 local shuttle workers. NASA's lead shuttle contractor is cutting staff as retirement of the shuttle fleet approaches later this year. The layoff affects a total of 248 employees across the Houston-based company, including 100 in Texas and five in other locations. The majority of the layoffs were "self-nominated." All were eligible for severance packages. The reduction leaves USA with about 6,400 employees companywide, including about 3,900 in Florida. Outgoing employees here are being processed this morning at the NASA Shuttle Logistics Depot facility in Cape Canaveral. A next round of layoffs is expected in the spring. Web posted. (2011). [USA lays off 143 KSC workers today [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, January 7].]

**January 8:** **Congresswoman, astronaut's wife shot in Tucson**

A member of Congress married to a NASA astronaut was shot and critically wounded Saturday morning in Tucson. Rep. Gabrielle Giffords (D-AZ) was one of 18 people shot by a single gunman outside a grocery store in Tucson, where Giffords was meeting with the public. Giffords, shot once in the head, was in critical condition at a Tucson hospital, but surgeons said they were "very optimistic" about her recovery. Six people were killed in the shooting. Giffords is married to NASA astronaut Mark Kelly, who is slated to command the STS-134 shuttle mission this spring. Kelly's brother, Scott, also an astronaut, is currently commanding the International Space Station. Giffords spent the previous two years as the chair of the space subcommittee of the House Science Committee. Web posted. (2011). [Congresswoman, astronaut's wife shot in Tucson [Online]. Available WWW: http://www.spacetoday.net/ [2011, January 9].]

**January 10: NASA orders full round of stiffeners to Discovery tank**

Senior NASA managers Monday agreed to install stiffeners all the way around the shuttle Discovery's external tank to beef up structural ribs, or stringers, that are susceptible to cracks when exposed to ultra-low-temperature propellant. Engineers say the modifications can be completed in time to support at launch as early as Feb. 24, assuming the work goes smoothly and no other major problems develop. The so-called radius block plates will be attached to the top few inches of all the stringers making up the ribbed intertank that separates the external tank's liquid oxygen and hydrogen sections. Eight known cracks in five of the 108 stringers already have been repaired by splicing in fresh stringer segments and installing doublers for additional strength. The cracks occurred near the top of the intertank where the stringers meet a large flange that supports the bottom of the liquid oxygen tank. Ultra-low-temperature liquid oxygen causes the tank to contract during fueling, which tends to pull the upper sections of the stringers inward. The tank was designed to cope with that contraction, but it appears a specific lot of aluminum alloy used in this tank's construction provided less strength than expected. The tanks scheduled for use with the shuttle Endeavour in April and the shuttle Atlantis in June or July were built with alloys that are believed to have the proper strength. To strengthen the rest of the stringers in Discovery's tank, radius block plates will be riveted into place over the anchors that hold the existing stringers in place. Testing indicates the modification will ensure the tank is up to the rigors of fueling and launch, giving it the safety margin needed to clear Discovery for flight. NASA and contractor managers and engineers are expected to set a new target launch date during a program requirements control board meeting Thursday. It's not yet clear how Discovery's launch delays will affect the following launch, a mission by the shuttle Endeavour to deliver a $2 billion physics experiment to the International Space Station. Web posted. (2011). [NASA orders full round of stiffeners to Discovery tank [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, January 10].]

**Astronauts Urge Preservation Of T-38s**

Though the 30-year-old space shuttle fleet is headed for retirement this year, NASA's director of flight crew operations and chief astronaut believe the agency should continue to fly a reduced fleet of aging T-38 supersonic jet aircraft based near Johnson Space Center as an essential part of future astronaut training. Brent Jett, a two-time shuttle commander who oversees the directorate responsible for NASA's astronaut corps and aircraft operations at Houston's Ellington Field, and Chief Astronaut Peggy Whitson, who served as commander during the most recent of her two six-month expeditions to the International Space Station, pressed the case for continued NASA operation of the vintage two-seat trainers during a Jan. 5 presentation to the Committee on Human Spaceflight Crew Operations. The 14-member panel, selected by the National Academies, is charged with assessing the future of NASA's astronaut corps, including its post-shuttle training requirements, in a report due by Aug. 31. The agency spends between $25 million and $30 million annually to fly and maintain its current fleet of 21 upgraded 1960s vintage T-38s, down from the 30-35 aircraft NASA maintained between 1995 and 2000. NASA's current projections show the number of jet trainers falling to 16 by about 2015. While it intends to retain the T-38s, NASA's flight crew operations directorate plans to dispose of four Grumman Shuttle Training Aircraft used to train astronauts for the steep runway approach of the winged orbiters; and a pair of Boeing 747 jumbo jets

outfitted to ferry the orbiters between Edwards Air Force Base, Calif., and NASA's Kennedy Space Center. Web posted. (2011). [Astronauts Urge Preservation Of T-38s [Online]. Available WWW: http://www.aviationweek.com/ [2011, January 10].]

**NASA won't speculate on flight by Giffords' husband**

The shocking gun down of Rep. Gabrielle Giffords has left NASA reeling: Her astronaut husband was due to rocket away in just three months as perhaps the last space shuttle commander, and her brother-in-law is currently on the International Space Station. Shuttle commander Mark Kelly rushed to his wife's hospital bedside Saturday as his identical twin brother, Scott, did his best to keep updated on the Arizona shooting through Mission Control, the Internet and the lone phone aboard the space station. In a statement, Mark Kelly expressed gratitude for the outpouring of support their family has received from Arizona and around the nation. The chief of the astronaut office broke the news to Scott Kelly that a gunman had shot his sister-in-law at a political gathering in Tucson soon after it happened. NASA officials said Sunday it was premature to speculate on whether Mark Kelly would step down as commander of the April flight of the shuttle Endeavour. Until last month, NASA hoped the Kelly brothers would meet in orbit, a PR dream for a space agency often confronted with bad news. But after fuel tank cracks grounded another shuttle mission, Mark Kelly's flight was bumped to April. His brother is to return home in March on a Russian spacecraft, so the reunion in space is off. Web posted. (2011). [NASA won't speculate on flight by Giffords' husband, but her condition makes it seem doubtful [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, January 10].]

**January 11: USA announces up to 600 Florida layoffs in April**

United Space Alliance today notified its employees that up to 700 shuttle program workers could be laid off on April 8, including 550 to 600 based at Kennedy Space Center. Affected employees will be notified no later than Feb. 4, 60 days before the layoff. The Houston-based company, which last Friday cut 143 local positions, had previously said it expected a small layoff in April. The layoffs are part of long-planned reductions as a result of the shuttle program nearing its final flight this year. USA, the lead shuttle contractor, currently employs 6,350 people, including about 3,900 in Florida. Web posted. (2011). [USA announces up to 600 Florida layoffs in April [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, January 11].]

**Sidelined shuttle flight may be launched in February**

NASA officials Tuesday said they have found the root cause of cracks in the external tank's support beams and expect to have the space shuttle Discovery ready for a possible launch in late February. John Shannon, the shuttle program manager, said extensive testing by engineers found that the cracks found in five of 78 support beams called "stringers" were caused by low fracture toughness combined with assembly stresses. "We have root cause and we have a fix which we are completely confident that will eliminate those root causes," said Shannon. NASA will place aluminum "radius blocks" at the end of the stringers to reinforce the support beams, said Shannon. Earlier cracks found in the foam covering the fuel tank delayed the shuttle's final launch, originally scheduled for November 1. Technicians repaired the cracks and reapplied foam insulation on aluminum brackets on the tank in November. Discovery is scheduled to deliver a storage module, a science rig and spare parts to the International Space Station. According to the NASA website, the launch would not be before February 24 and would depend on traffic at the space station, which is set to receive cargo from a European spacecraft in mid-February. The last scheduled launch of space shuttle Endeavour has been pushed backed nearly three weeks to April 18 and shuttle Atlantis is tentatively scheduled to launch late in August. Web posted. (2011). [Sidelined shuttle flight may be launched in February [Online]. Available WWW: http://www.cnn.com/ [2011, January 11].]

**Delta 4-Heavy to usher in 2011**

The West Coast's eagerly awaited debut of the behemoth Delta 4-Heavy rocket is set to kick off the 2011 launch year at Vandenberg Air Force Base. Targeting a blastoff next week, perhaps as early as Jan. 20, the Delta 4-Heavy, built by United Launch Alliance, will fly from Space Launch Complex-6 on South Base. "This launch will be the culmination of a multiyear effort to not only prepare this rocket and satellite for launch but also to modify and upgrade SLC-6 ...," said ULA spokesman Mike Rein. "We haven't launched at SLC-6 since 2006, so this is definitely pretty exciting just from the fact that SLC-6 is back in operational use and with the launch now all configurations of our rockets can be launched from Vandenberg Air Force Base." Liftoff once had been planned for today, but was postponed at least a week due to scheduling and weather delays. The launch window for the nearly 24-story-high rocket remains classified because the booster is carrying a top-secret payload for the National Reconnaissance Office. However, sources are saying the blastoff is scheduled for 1:08 p.m. Jan. 20. Upon liftoff, the rocket will produce almost 2 million pounds of thrust, the power of 33 Hoover Dams, according to ULA. By comparison, the Titan 4 rocket produces 3.2 million pounds of thrust. After Delta ushers in the new year, the manifest also calls for two rocket launches in February — a Minotaur mission for NRO early in the month and a Taurus rocket with a NASA satellite Feb. 23. Web posted. (2011). [Delta 4-Heavy to usher in 2011 [Online]. Available WWW: http://www.cnn.com/ [2011, January 11].]

**January 12: Space shuttle layoffs stay on plan, if not on schedule**

NASA says its plans to lay off the shuttle workforce bit by bit remain on track, despite the delays of mission STS-133, and the addition of STS-135. Granted, some of the workforce is staying on longer because the program is running a little longer, but shuttle program manager John Shannon said the basic plan they've had for several years is still being followed. As production of external tanks, or solid rocket boosters say, wraps up, the workforce that built them is being laid off, but what he calls a "sustaining engineering" staff has stayed -- able to apply the engineering knowledge to problems that crop up like the stringers on the tank of STS-133. But Shannon says they did need the workers who know how to do the specialized work. We hired back, because of the metal work that was required on the tank, I think it was 22 people that were previously either moved back inside the Lockheed Martin Corporation, or had gone out on the street. And they came back very happily and very willingly, and they're working down at KSC on the tank and they'll be used on whatever repairs we decide to do on ET-138. That's the external tank to be used on one of the last missions that they think may have the same problems. Incidentally, NASA managers also say they will officially start calling the flight added by congress STS-135, instead of 335, which indicated it was a contingency rescue mission. There is still a budget issue to fund the flight. It was approved in the NASA Authorization act, but the funding remains in limbo because the lame duck Congress did not pass an appropriations act. As of now, NASA has targeted STS-133 to launch no earlier than Feb. 24. Web posted. (2011). [Space shuttle layoffs stay on plan, if not on schedule [Online]. Available WWW: http://www.cfnews13.com/ [2011, January 12].]

**NASA says it needs more cash, time to build rocket to replace shuttle**

Top NASA officials told lawmakers this week that they cannot build the replacement for the space shuttle that Congress wants on the budget and deadline they were given. "These [spacecraft] systems must be affordable, sustainable, and realistic," the agency said in a remarkably candid 22-page report. Congress' plan would not "meet … these goals." "None of the design options studied thus far appeared to be affordable in our present fiscal conditions, based upon existing cost models, historical data, and traditional acquisition approaches," the report says, adding: "Any [spacecraft] designs selected … must meet the test of being realistic — not relying on assumptions of increased funding or other 'miracles' for attainment." The bombshell is a major blow to hopes for the quick development of a new heavy-lift rocket and Apollo-like capsule capable of taking humans to the moon and beyond. It is also a major setback for Kennedy Space Center, which is set to lose at least 6,000 jobs during the next year as NASA retires the space shuttle. The center is expected to languish with no follow-on program imminent. In addition, a planned five-year, $2 billion program to modernize KSC's aging infrastructure could well be cut or eliminated to find more money for the new rocket. The report prompted a sharply worded response

from the Senate Commerce Committee, including U.S. Sens. Bill Nelson, D-Fla., and Kay Bailey Hutchison, R- Texas, who were the principal authors of the plan passed by Congress last year. "[T]he production of a heavy-lift rocket and capsule is not optional. It's the law," they said. "NASA must use its decades of space know-how and billions of dollars in previous investments to come up with a concept that works. We believe it can be done affordably and efficiently — and, it must be a priority." Nelson himself issued a two-sentence statement: "I talked to [NASA Administrator] Charlie Bolden yesterday and told him he has to follow the law, which requires a new rocket by 2016. And, NASA has to do it within the budget the law requires." Under the plan signed into law by President Barack Obama in October, NASA was supposed to get $11 billion during the next three years to start building a rocket and capsule that could as a first step fly to the International Space Station by Dec. 31, 2016. But new pressure in Congress to slash federal spending means that NASA is unlikely to get even that much. The plan was intended to keep the human-spaceflight program alive while also preserving jobs in key NASA states such as Alabama, Florida, Texas and Utah. It called for using hardware from the shuttle and the Constellation moon-rocket program, which was canceled last year by Congress and the White House after the agency had spent nearly $12 billion on a technically controversial rocket and capsule. The new plan had been greeted skeptically by some former astronauts and space experts, because the new projects would get even less money than Constellation's rocket ships, which were over budget and years behind schedule. Still, Nelson predicted success. If NASA couldn't build a rocket on the budget it was given, he said last year, "we ought to question whether we can build a rocket." The new law all but orders NASA to build its new rocket with shuttle and Constellation pieces, including solid rocket boosters currently used on the space shuttle. Web posted. (2011). [NASA says it needs more cash, time to build rocket to replace shuttle [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, January 12].]

**NASA begins space shuttle Discovery tank modifications**

NASA technicians have begun work to modify the support beams on space shuttle Discovery's external fuel tank. Additional support structures, called radius blocks, are being added to the tank's 94 stringers. By the time the work is finished, the entire circumference of the external tank will be strengthened. Meanwhile, at the Johnson Space Center in Houston, STS-133 mission specialists Alvin Drew, Tim Kopra and Nicole Stott, who are waiting to fly to the International Space Station aboard Discovery, are spending Wednesday conducting a review of spacewalking procedures. Mission Commander Steve Lindsey and pilot Eric Boe will fly to the Space Coast in their T-38 training jets for approach and landing runs in Shuttle Training Aircraft at the Kennedy Space Center's Shuttle Landing Facility. NASA said Tuesday that Discovery launch no earlier than Feb. 24. Shuttle managers, however, have not yet set an exact target date for the mission. The schedule depends in part on traffic at the International Space Station during that time frame. A European cargo spacecraft, ATV-2, is scheduled to launch to the station on Feb. 15, carrying supplies and equipment. Web posted. (2011). [NASA says it needs more cash, time to build rocket to replace shuttle [Online]. Available WWW: http://www.cfnews13.com/ [2011, January 12].]

**Astronauts Selected for 2011 U.S. Astronaut Hall of Fame Induction**

Karol J. "Bo" Bobko and Susan J. Helms will join an elite group of American space heroes as they are inducted into the U.S. Astronaut Hall of Fame® during a ceremony at Kennedy Space Center Visitor Complex on Saturday, May 7, 2011. They will be welcomed to the ranks of legendary space pioneers like Neil Armstrong, John Glenn, Alan Shepard, Jim Lovell, Sally Ride and John Young – distinguished members of this unique Hall of Fame. This is the tenth group of space shuttle astronauts named to the U.S. Astronaut Hall of Fame. Earlier inductees represent the Mercury, Gemini, Apollo, Skylab and Apollo-Soyuz programs. The addition of Bobko, a shuttle commander who flew two orbiters' first flights; and Helms, a spacewalker who set a world record outside the International Space Station, will bring the number of space explorers enshrined in the Hall of Fame to 79. Web posted. (2011). [Veteran Space Shuttle Astronauts

Selected for 2011 U.S. Astronaut Hall of Fame Induction [Online]. Available WWW: http://media.kennedyspacecenter.com/ [2011, January 12].]

**Multimillion-Dollar Space Tourist Trips to Resume in 2013**

An American space tourism company that sells multimillion-dollar tourist flights to the International Space Station announced today (Jan. 12) that it will resume the high-society spaceflights in 2013, after a five-year lull. Virginia-based Space Adventures will have three seats available on Russian Soyuz space capsules per year starting in 2013, according to a new agreement with Russia's Federal Space Agency (Roscosmos) and the country's spacecraft manufacturer, RSC Energia. Space Adventures has arranged eight private space tourist flights to the station for seven people (one billionaire customer flew twice) since 2001. The new deal to send paying tourists to the International Space Station was made possible, in large part, by the planned increase in production of the nonreusable Soyuz spacecraft – to five spacecraft per year from the current four, adding an extra flight to the launch schedule, Space Adventures officials said. Web posted. (2011). [Multimillion-Dollar Space Tourist Trips to Resume in 2013 [Online]. Available WWW: http://www.space.com/ [2011, January 12].]

**January 13: NASA Slips Target Launch Date for Endeavour To April 19**

NASA is moving the target date for the last launch of the orbiter Endeavour to April 19 to give engineers and technicians time to perform tests and modifications on its bullet-shaped external tank. Liftoff time on April 19 is targeted for 7:48 p.m. The move from April 1 will enable engineers to perform a propellant-loading test on the shuttle's 15-story external tank. Modifications also will be made to crack-prone support beams that booster the section that separates the upper and lower sections of the tan. Small cracks were detected on support beams on shuttle Discovery's external tank after a Nov. 5 launch scrub. NASA since has returned Discovery to the Kennedy Space Center Vehicle Assembly Building for repairs and modifications. The target date for Discovery's 39th and final flight was moved to Feb. 24 from Feb. 3 as a result. Liftoff time on Feb. 24 is set for 4:50 p.m. The target dates were set today at a weekly shuttle program meeting. Firm dates will be established after flight readiness reviews for either mission. Web posted. (2011). [NASA Slips Target Launch Date for Endeavour To April 19 [Online]. Available WWW: http://www.floridatoday.com/ [2011, January 13].]

**NASA research money wasted, report says**

NASA is wasting more than $2 million a year in research funding targeted for small businesses, two senators complained Wednesday. Money from the Small Business Innovation Research program was supposed to stimulate technological innovation. Instead, the agency's inspector general said the program paid vendors multiple times for the same projects. "We can't afford to lose any of our precious research and development dollars to waste, fraud or abuse," said Sen. Jay Rockefeller, D-W.Va., chairman of the committee that oversees NASA. Inspector General Paul Martin found that 25 percent of NASA's payment awards in 2008 were for undocumented or ineligible expenses. The payments totaled $2.7 million that year. "Consequently, some SBIR award recipients may have received multiple SBIR awards from different federal agencies for the same research, or NASA may have received highly questionable research products for its contract money," the 78-page audit said. NASA and Small Business Administration databases identify 31 firms with 98 potentially duplicative contracts worth $26.8 million for "lithium batteries." NASA's chief technology officer, Robert Braun, disputed the report's conclusions, saying they're based on a lack of paperwork rather than evidence of wasteful spending. Web posted. (2011). [NASA research money wasted, report says [Online]. Available WWW: http://www.floridatoday.com/ [2011, January 13].]

**Senators to NASA: You can -- and will -- build big rocket**

NASA cannot build a heavy-lift rocket and crew exploration vehicle under the cost, schedule and engineering constraints imposed last fall by Congress, the agency said in a report this week. Legislators had a curt response: Tough luck. Buck up and get on with it. "The production of a heavy-lift rocket and

capsule is not optional. It's the law," U.S. Sen. Bill Nelson, D-Orlando, and three other members of the Senate Commerce Committee said Wednesday evening in a joint statement. The tussle erupted after NASA gave Congress a report that says the agency cannot field a new supersized rocket and astronaut spaceship by a target date of Dec. 31, 2016 -- at least not under conditions levied by legislators. "NASA does not believe this goal is achievable based on a combination of the current funding profile estimate, traditional approaches to acquisitions and currently considered vehicle architectures," said the report, which was posted on website nasaspaceflight.com and later released by Congress. "We will not commit to a date that has a low probability of being achieved." Nelson and colleagues -- U.S. Sen. Jay Rockefeller, D-W.Va.; U.S. Sen. Kay Bailey Hutchison, R-Texas; and U.S. Sen. David Vitter, R-La. -- begged to differ: "We believe it can be done affordably and efficiently -- and it must be a priority." With the nation's shuttle fleet set for retirement this year and NASA's moon program canceled, the future of the agency's human spaceflight program has been clouded by uncertainty. President Barack Obama last February directed NASA to shift responsibility for flying astronauts to and from low Earth orbit to commercial companies. Then, Congress on Sept. 30 passed the 2010 NASA Authorization Act, giving the agency the go-ahead to develop a heavy-lift rocket and crew exploration spacecraft for missions beyond Earth orbit. Congress said the heavy-lift rocket initially should be able to haul 70 to 100 metric tons into low Earth orbit. Subsequent upgrades should enable it to boost 130-metric ton payloads. The legislation authorized $6.9 billion for the development of the heavy-lift rocket over the next three years, with $1.6 billion in 2011. A separate Senate Appropriations report proposed a project cost cap at $11.5 billion through 2017. Critics claimed Congress was micromanaging the design of the rocket and ought to leave the engineering to the experts at NASA. Congress tasked NASA to report back within 90 days. The agency delivered a preliminary study this week. NASA came up with a huge rocket powered by shuttle main engines; larger, five-segment versions of shuttle solid rocket boosters; a stretched version of the shuttle's external tank; and an upper stage engine that was being developed for the Ares rockets. NASA would continue the development of the Apollo-style Orion space capsule -- a product of the canceled moon program. Officials said that rocket and spacecraft best fit within congressional guidelines. But the design would not yield an affordable, sustainable, realistic transport system within congressional cost and schedule constraints, NASA said. The agency hinted that previous studies yielded candidate designs that might better meet overall objectives. NASA spokesman Michael Braukus deferred comment on the report, saying many in Congress have yet to read it. Web posted. (2011). [Senators to NASA: You can -- and will -- build big rocket [Online]. Available WWW: http://www.floridatoday.com/ [2011, January 13].]

**Backup named for Endeavour commander if needed**

NASA on Thursday slipped the last launch of shuttle Endeavour to April 19 and assigned a backup commander in case Mark Kelly -- the husband of Tucson shooting victim U.S. Rep. Gabrielle Giffords -- can't serve in that capacity. Kelly, 46, remains the commander of the International Space Station outfitting mission, NASA's 134th and penultimate shuttle mission. But veteran astronaut Rick Sturckow, 49, will step in as a backup so flight training can resume next week. It is an unusual move in extraordinary circumstances. NASA trains backup crews for long-duration stays aboard the International Space Station but not for relatively short shuttle flights. Kelly, who has been training to command the mission since August 2009, flew to Tucson shortly after the shooting Saturday and has been caring for his wife, who remains hospitalized in critical condition. "Mark is still the commander of STS-134," NASA Chief Astronaut Peggy Whitson said. The 25th and final flight of Endeavour is targeted to launch at 7:48 p.m. April 19. NASA pushed the launch back from an April 1 target to give engineers and technicians more time to test and modify crack-prone support beams on the shuttle's 15-story external tank. The move also will give ground crews more time to complete launch-pad prep work between the planned Feb. 24 launch of Discovery and the Endeavour flight. Web posted. (2011). [Backup named for Endeavour commander if needed [Online]. Available WWW: http://www.floridatoday.com/ [2011, January 14].]

**NASA Safety Hurt by Policy Disputes, Report Finds**

U.S. astronaut safety is threatened by continuing disputes over NASA's direction, as well as by the agency's own rules for new spacecraft designs, according to a high-level federal oversight group. The independent panel warned that U.S. manned exploration of space may face greater risks due to the "lack of clarity and constancy of purpose among NASA, Congress and the White House." In a report released Thursday, NASA's Aerospace Safety Advisory Panel concluded that disputes over the agency's missions and funding levels "can negatively affect worker morale and the ability to attract and maintain" a skilled work force needed to "effectively reduce risk going into the future." The latest concerns about NASA's drift come amid heightened uncertainty over its budget and policy priorities, as the new House Republican leadership begins to spell out a vision for the agency. Veteran GOP lawmakers on committees overseeing NASA generally have strongly opposed White House efforts to turn over core agency functions—including transporting astronauts to and from the international space station—to commercial rocket and spacecraft suppliers and operators. Another portion of the report by the congressionally chartered oversight panel focuses on fundamental questions such as "how safe is safe enough" when it comes to replacing the existing space-shuttle fleet. As part of its annual safety scorecard, the eight-member panel criticized the agency's design criteria for next-generation space vehicles. NASA's recently established acceptable risk levels for a fatal accident, according to the report, "may not be as safe as modern technology can and should provide." The panel urged NASA to reassess its risk criteria. And it said astronaut safety in coming decades will be "profoundly linked" to establishing "a good acquisition strategy as quickly as possible" for commercial spacecraft. Web posted. (2011). [NASA Safety Hurt by Policy Disputes, Report Finds [Online]. Available WWW: http://online.wsj.com/ [2011, January 15].]

**January 15: Shuttle Discovery's lead spacewalker hurt in accident**

Space station veteran Timothy Kopra, scheduled for launch Feb. 24 aboard the shuttle Discovery, was injured in a bicycle accident Saturday, a NASA official said. The injury was not life threatening and the NASA official, citing medical privacy issues, provided no additional details. But multiple sources said Kopra may have broken his hip, raising the prospect of a significant impact to the already-delayed mission. In training to serve as flight engineer for launch and entry, Kopra also is the mission's lead spacewalker for a pair of excursions outside the station. He and his crewmates have been in training since September 2009. NASA does not train backup crews and a replacement, even a recently flown veteran, would need time to rehearse spacewalk scenarios and receive mission-specific training for Discovery's flight. How long that might take, if required, and what impact it might have on the shuttle's launch date is not yet known. Web posted. (2011). [Shuttle Discovery's lead spacewalker hurt in accident [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, January 15].]

**Former space shuttle Columbia crew reunites**

U.S. Sen. Bill Nelson hosted a 25th reunion of the Columbia shuttle crew [STS 61-C] he joined during a weekend of celebrating their giddy success while also somberly reflecting on the dangers of human spaceflight. The Orlando Democrat hosted crew members for a dinner at his home Saturday. He then led them on a Sunday tour of the Capitol, with a pause for a moment of silence at a first-floor painting of the crew of shuttle Challenger, which blew up 10 days after Nelson's flight landed. "That's what makes us gathering up all the more special to me," Nelson said. Besides dinner and the Capitol tour, the crew members planned to visit the Smithsonian Institution's portion of the Air and Space Museum that restores spacecraft for public display. The group also planned a tour of the White House's West Wing. Web posted. (2011). [Former space shuttle Columbia crew reunites [Online]. Available WWW: http://www.floridatoday.com/ [2011, January 17].]

**January 16: STS-133: Discovery aiming for Feb 1 rollout**

Shuttle Discovery is aiming to roll back out to Pad 39A on February 1, following what will be the completion of numerous "radius block" modifications to the circumference of her External Tank (ET-137). NASA managers are also evaluating impacts to crew training – and potentially the launch date – following the injury sustained by STS-133's Tim Kopra during a biking accident. Engineers and

technicians are methodically working their way around the LO2 Flange on the top of ET-137's Intertank, removing foam, carrying out stringer work, followed by the reapplication of BX-265 foam. With work on schedule, a preliminary timeline has been set out, with a target completion date for the modifications posted as January 27, which would allow for Discovery to rollout to 39A on February 1. Both dates hold some flexibility via contingency days. Web posted. (2011). [STS-133: Discovery aiming for Feb 1 rollout – Crewmember Kopra injured [Online]. Available WWW: http://www.nasaspaceflight.com/ [2011, January 16].]

**Shuttle 'spiders' work up high**

The ocean view was fine from 200 feet up launch pad 39A at Kennedy Space Center. But if David Schuermann took a careless step, only a harness and 10-foot lifeline would stop him from plummeting to Discovery's mobile launcher platform below. If the safety equipment worked, the lead rigger on United Space Alliance's appropriately named "high crew" would be left dangling inches from the shuttle's external tank and left solid rocket booster. Working behind the scenes and above them, members of the 14-man high crew played a key role in the two-month effort to investigate and repair cracked support beams on Discovery's fuel tank. The work has the shuttle back on track for a targeted Feb. 24 launch on its final flight, 10 months after its previous mission. Identified by the radio call sign "spider," the high crew spins webs of scaffolding that bridge gaps between structures and out-of-reach areas on the shuttle, allowing engineers and technicians to work on any part of the spaceship. "We provide access to where there is none," Schuermann said. After a Nov. 5 launch scrub, cameras spotted a significant crack in orange insulating foam covering the top of a 21-foot beam, located high on the tank's ribbed mid-section, or intertank. The pad's rotating gantry wraps halfway around the intertank and an access arm extends to it, but neither allowed access to the crack. Enter Schuermann's team of four -- two on the pad surface and two high above -- who helped assemble a 7-foot-tall framework more than 20 stories up that provided a safe platform for hands-on access to what turned out to be two damaged beams, or stringers. The crew again braved the heights and elements -- special clearance is required when winds exceed 18 knots -- when the shuttle program ordered a Dec. 17 tanking test. They built platforms that assisted with the installation and wiring of dozens of gauges and sensors on the tank, and helped install high-resolution cameras. The high crew has never suffered a fall, and says no injuries have resulted from structures it has built. Web posted. (2011). [Shuttle 'spiders' work up high [Online]. Available WWW: http://www.floridatoday.com/ [2011, January 16].]

**Airship builder returns to KSC**

A Maryland company has relocated to Kennedy Space Center with the intention of refining and selling its 111-foot unmanned airship, adding another player to an economic niche that could help the move the county beyond the loss of the space shuttle program. Sanswire Corp. opened an office Dec. 15 near Space Florida's offices at the KSC Visitor Complex. It will have just a handful of people on staff initially but could employ dozens of engineers and technicians if and when buyers come forward or government funding is secured. "The faster the orders come in, the quicker we'll ramp up the staff. I think there's a plethora of talented people in this area," CEO Glenn Estrella said, noting that the skilled work force was a factor in the relocation. The STS-111 is an 111-foot long, lighter-than-air unmanned aerial vehicle, or UAV, that could provide days' of inexpensive surveillance or operational support at a fraction of the cost of a satellite. Space Florida President Frank DiBello said he believes the fledgling company could help lure other unmanned aerial vehicle development companies to KSC, which could generate much-needed high-tech jobs. The Economic Development Commission of Florida's Space Coast, which was involved in bringing Sanswire to town, has studied and targeted companies that manufacture UAVs and related components in hopes of luring them here. "The Space Coast has significant infrastructure in place to support growth in the field of UAVs," Lynda Weatherman, EDC president and chief executive officer, told *Florida Today* last year. "It's a growing product in a growing industry, and the full potential of these vehicles is still emerging." Sanswire's airship, which looks like a cross between a windsock and a slim dirigible and was named one of Time magazine's 50 most best inventions of 2010, is powered by a remote

controlled, 17- or 22-horsepower gasoline engine and is made of reinforced rip-stop nylon. The test vehicle will have a top speed of 40 mph and a maximum service ceiling of 15,000 feet. Lighter-than-air helium provides the lifting power for the 30-pound payload, while the engine near the nose provides the steering and forward motion. When deflated, the vehicle could be carried in a small truck for launch from remote locations. Web posted. (2011). [Airship builder returns to KSC [Online]. Available WWW: http://www.floridatoday.com/ [2011, January 16].]

**January 17: Voyager 1 at edge of solar system**

You probably have more computing power in your pocket than what NASA's venerable Voyager spacecraft are carrying to the edge of the solar system. Even so, the twin explorers, now 33 years into their mission, continue to explore new territory as far as 11 billion miles from Earth. And they still make global news. Scientists announced last month that Voyager 1 had outrun the solar wind, the first manmade object to reach the doorstep to interstellar space. Sometime around 2025, the two craft will fall silent. In 40,000 years, Voyager 1 will sail as Earth's ambassador among the stars of the constellation Camelopardalis — the Giraffe — in the northern sky. Voyager 2 is headed for Sirius, the brightest star in the sky. It should arrive in 296,000 years. Web posted. (2011). [Voyager 1 at edge of solar system [Online]. Available WWW: http://www.baltimoresun.com/ [2011, January 17].]

**SpaceX proposes rocket-powered landing system**

SpaceX announced Monday it submitted a proposal to NASA last month to start an estimated $1 billion process upgrading the company's Dragon capsule, the first step in making the ship ready for crew rotation flights to the International Space Station. The Hawthorne, Calif.-based firm transmitted the proposal to NASA Dec. 13. It entered the second Commercial Crew Development, or CCDev 2, competition along with several other aerospace contractors for a share of the expected $200 million payout to be released as early as March. According to a SpaceX website update, the company is proposing to begin the design of a launch abort system, the emergency escape rocket that would save astronauts from an exploding rocket. Unlike traditional emergency systems, called a tractor design by engineers, SpaceX wants to build an integrated launch abort rocket to provide escape capability throughout the rocket's flight to orbit. Tractor designs used by the U.S. Mercury and Apollo programs were thrown away a few minutes after liftoff, as soon as their boosters cleared the atmosphere. The integrated system would be part of the Dragon capsule, staying with the spacecraft during months at the International Space Station and returning to Earth at the end of a normal flight. It could even be fired for a rocket-assisted touchdown on land, bringing astronauts home to a soft landing closer to recovery teams. Musk alluded to the rocket-powered landing concept in a press conference last month. An emergency parachute would always be carried as a backup, according to SpaceX. Web posted. (2011). [SpaceX proposes rocket-powered landing system [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, January 18].]

**January 18: Computing: A Private Space Shuttle Replacement**

The Dream Chaser will go into orbit on the nose of a rocket, then land gently on airport runways. Once the space-shuttle program ends this year, the only way to get people into orbit and to the International Space Station will be to buy seats on Russia's three-person Soyuz capsules. So NASA, through its Commercial Crew Development program, has given $50 million in grants to companies developing new spacecraft capable of carrying people and supplies into orbit and to the space station. The recipient of the biggest chunk of this money was the Sierra Nevada Corporation, which received $20 million to develop the Dream Chaser. This spacecraft, the size of a business jet, will take cargo and up to eight people into low Earth orbit, where the space station is located, and then return and land on commercial airport runways. The company reached all its development milestones for the Dream Chaser last year and is now finishing a battery of tests on the craft's carbon-composite frame. The shell of the spacecraft must be able to endure heavy loads and intense vibrations. So the Dream Chaser frame has been mounted on an earthquake simulator in a lab at the University of Colorado in Boulder. So far, the design has performed as expected, says Mark Sirangelo, head of Sierra Nevada's Space Systems division. At facilities in San

Diego, the company has been testing the craft's hybrid rocket motors. In the coming months, the company will put the two together to complete a full prototype, carry it into the air, and drop it to see how it flies. . Web posted. (2011). [Computing: A Private Space Shuttle Replacement [Online]. Available WWW: http://www.technologyreview.com/ [2011, January 18].]

**January 19: NASA pulls injured astronaut off upcoming flight of space shuttle Discovery**

An astronaut who crashed his bicycle last weekend won't be taking part in space shuttle Discovery's final voyage next month. Astronaut Timothy Kopra suffered unspecified injuries in the accident Saturday, just 1½ months before Discovery's planned liftoff. He is recuperating and on indefinite sick leave. In a rare swap-out Wednesday, NASA removed Kopra from the crew and added veteran spaceman Stephen Bowen, who flew last May on the most recent shuttle flight. Bowen will take over Kopra's spacewalking duties during the 11-day flight. Kopra had been designated as the lead spacewalker and was to venture out twice to perform work on the International Space Station. The shuttle flight has been on hold since November because of fuel tank cracks. Just last week, NASA said it had finally zeroed in on a cause for the potentially dangerous cracking. Shuttle repair work is continuing; Discovery's target launch date is Feb. 24. This is the second time this month that NASA had had to deal with crew issues. Last week, NASA named a backup commander for the final flight of Endeavour in April. The official commander, Mark Kelly, remains at the hospital bedside of his wife, Rep. Gabrielle Giffords, who was seriously wounded in a shooting in Tucson, Ariz. His identical twin brother, Scott, is flying on the space station right now as its skipper. Web posted. (2011). [NASA pulls injured astronaut off upcoming flight of space shuttle Discovery, adds new crewman [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, January 19].]

**Delta 4-Heavy ready to serve nation from West Coast pad**

Ever since the final Titan 4 rocket soared over the horizon from Vandenberg Air Force Base five years ago, the nation lacked the ability to deploy the largest of reconnaissance satellites into polar orbits from the West Coast. But that gap will be closed this week when the modernized replacement makes its California debut. The Delta 4-Heavy rocket, made by United Launch Alliance, is scheduled for liftoff Thursday at 1:08 p.m. PST (4:08 p.m. EST; 2108 GMT) from Space Launch Complex 6. The booster is carrying a massive spy satellite like the ones the Titans used to deploy before those rockets were retired from service in 2005. Web posted. (2011). [Delta 4-Heavy ready to serve nation from West Coast pad [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, January 19].]

**KSC cargo teams reset for a new era**

Before taking flight to the International Space Station this week aboard Japan's "white stork," a set of spare parts traveled halfway around the world from Kennedy Space Center. A KSC team oversaw the parts' testing, shipment and integration with Japan's unmanned H-II Transfer Vehicle, or HTV, which was set to launch at 1:29 a.m. EST on Thursday from the Tanegashima Space Center in Japan. It's the sort of processing work that will continue here for dozens of employees after the shuttle retires and the station relies on international partners and later commercial vehicles to deliver supplies and cargo. "Station is still going to be going for another 10 years," said Jose Nunez, the mission manager who oversaw the KSC processing team. "Any unpressurized cargo that flies on an HTV, we will be processing, we will be managing and shipping it over there." It was a role reversal for the KSC team accustomed to receiving payloads from outsiders and readying them for launch on the shuttle. "We really basically changed our hats 180 degrees," Nunez said. "This was the first time that we actually went to somebody else's facility, we had to live by their work rules, follow their processes and so on." The final two or three shuttle flights will be filled with as many supplies and large spare parts as possible. But more spares must be staged in orbit so the station is ready to respond to critical equipment failures, like one last summer that temporarily knocked out half the outpost's coolant system. In exchange for launching Japan's Kibo lab modules on the shuttle, NASA owns space on seven HTV missions, the first of which launched in September 2009. The next flight will be only the second by an HTV, the only spacecraft other than the shuttle able to

deliver unpressurized cargo until SpaceX's Dragon spacecraft becomes operational. Web posted. (2011). [KSC cargo teams reset for a new era [Online]. Available WWW: http://www.floridatoday.com/ [2011, January 19].]

**January 20: Atlantis officially named final shuttle mission**

Atlantis is now officially designated to fly the year's third and final shuttle mission before the fleet is retired. In a weekly program meeting today, shuttle managers changed the flight's numeric designation from STS-335 to STS-135, signifying a shift from a potential "launch on need" mission to one formally on the manifest. It is targeted for launch to the International Space Station at 3:48 p.m. EST June 28, though station managers would like to see the mission flown later in the summer to best serve the outpost's long-term supply needs. The mission has been anticipated since it was requested in the NASA authorization bill signed into law in October. But funding has remained uncertain with NASA operating under a budget held at 2010 levels through at least March 4. Today's change directs training and other preparations to proceed despite that ongoing uncertainty. A crew of four led by Chris Ferguson has already been named to fly the mission, which would launch with the Italian-built cargo module nicknamed Raffaello. Web posted. (2011). [Atlantis officially named final shuttle mission [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, January 20].]

**Delta IV Heavy, spy satellite blast off from California**

A national security satellite was headed to orbit this afternoon after the first-ever launch of a Delta IV Heavy from California. The triple-barreled United Launch Alliance rocket blasted off from Vandenberg Air Force Base at 4:10 p.m. EST carrying a National Reconnaissance Office payload. Because of the mission's secrecy, a ULA Webcast of the launch cut off about six minutes into flight following the separation of three first-stage boosters, ignition of the upper stage engine and jettison of a fairing shielding the rectangular, school bus-sized satellite. It was the fourth operational flight of the heavy Delta IV configuration, the fifth overall since 2004, and the first from the West Coast. Web posted. (2011). [Delta IV Heavy, spy satellite blast off from California [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, January 20].]

**January 23: 'Voice of NASA' reflects on Challenger**

Friday [January 28th] marks 25 years since the loss of space shuttle Challenger. Hugh Harris, "the Voice of NASA," provided the iconic countdown. "Well, it felt awful," Harris said. "We knew instantly that the chances of the crew having survived were practically nothing." The truth was, of course, that the crew hadn't survived. But the crew in the firing room had no time to reflect on that. They had work to do, and they did it. "There's procedures for almost every contingency you can think of," Harris said. "And immediately people started working with the Coast Guard and the Air Force on the recovery efforts, and safeing the pad and all the things that had to be done from a technical standpoint." There was some confusion. NASA had just gotten a new administrator and a new chief of Public Affairs, and neither had a chance to go through the contingency plans on catastrophic events. So some of the things the plan called for were countermanded. "Continuing commentary, for instance, commentary was supposed to switch back here to the Center," Harris said. "(Normally it goes to Houston?) And it had gone to Houston. You may remember that Steve in Houston said obviously, a 'major malfunction.' At that point it was supposed to come back here, but headquarters said we don't want you continuing the commentary, cause I would have talked about what was happening in the firing room, and here's the procedures we are going through." Harris said for most of the people closest to the Challenger tragedy, it was the same as for the rest of us -- it took a while for it all to sink in. "Well, I don't think you get it right away, because you have a job to do, and you continue doing that job," Harris said. "And I think it's only after you leave, maybe go home, and then start thinking about what does this really mean, and what really happened." Web posted. (2011). ['Voice of NASA' reflects on Challenger [Online]. Available WWW: http://www.baynews9.com/ [2011, January 23].]

**January 24: STS-133: Stringer repairs/modifications to be completed on ET-137**

A group of United Space Alliance (USA) and Michoud Assembly Facility (MAF) technicians and engineers are heading into the final few days of work on modifying the stringers on Discovery's External Tank (ET-137). With the root cause evaluations and subsequent modifications ensuring there is "no uncertainty" on all flight tanks, STS-133 remains on track for rollout to Pad 39A next Monday. With the work ongoing on ET-137, Discovery is now being warmed up for her return to Pad 39A via repressurization and decay checks, ensuring the orbiter's unexpected stay in the Vehicle Assembly Building (VAB) held no adverse effects on her systems. This saw Discovery powered up at the end of last week, allowing engineers to conduct a repressurization of an Auxiliary Power Unit (APU) gearbox. Also a clear sign of Discovery's upcoming launch window – which opens on February 24 – is the replenishment of Liquid Oxygen (LOX) at the storage tanks located near the pad, along with preparations being conducted on the Rotating Service Structure (RSS), which will rotate to protect Discovery shortly after her return to the pad. Web posted. (2011). [STS-133: Stringer repairs/modifications to be completed on ET-137 this week [Online]. Available WWW: http://www.nasaspaceflight.com/ [2011, January 24].]

**For NASA, Longest Countdown Awaits**

For NASA, as it attempts to squeeze a workable human spaceflight program into a tight federal budget, the answers appear to be "somewhere" and "not anytime soon." When the space shuttles are retired this year — and only one flight remains for each of the three — NASA will no longer have its own means for getting American astronauts to space. What comes next is a muddle. A panel that oversees safety at NASA took note of the uncertainty in its annual report, released this month. "What is NASA's exploration mission?" the members of the Aerospace Safety Advisory Panel asked in their report. The panel added: "It is not in the nation's best interest to continue functioning in this manner. The Congress, the White House, and NASA must quickly reach a consensus position on the future of the agency and the future of the United States in space." A nagging worry is that compromises will leave NASA without enough money to accomplish anything, and that — even as billions of dollars are spent — the future destination and schedule of NASA's rockets could turn out to be "nowhere" and "never." In that case, human spaceflight at NASA would consist just of its work aboard the International Space Station, with the Russians providing the astronaut transportation indefinitely. A NASA study, completed last month, came up with a framework for spaceflight in the two next decades but deferred setting specific destinations, much less timetables for getting there. One of the study's conclusions was that trying to send astronauts to an asteroid by 2025 — as President Obama had challenged the agency to do in a speech last April — was "not prudent," because it would be too expensive and narrow. Instead, the study advocated a "capability-driven framework" — developing elements like spacecraft, propulsion systems and deep-space living quarters that could be used and reused for a variety of exploration missions. Meanwhile, in Washington, the fight is less of a conflict of grand visions than a squabble over dollars and the design details of a rocket. Last fall, in passing an authorization act for NASA, which laid out a blueprint for the next three years, Congress called for NASA to start work on the heavy-lift rocket. It also said that the design should be based on available technologies from the existing space shuttles and from Constellation; that the rocket should be ready by the end of 2016, and that NASA could have about $11.5 billion to develop it. Web posted. (2011). [For NASA, Longest Countdown Awaits [Online]. Available WWW: http://www.nytimes.com/ [2011, January 24].]

**NASA seeking tenants for Florida launch facilities**

NASA released Monday a request for information from industry on potential future uses for the Kennedy Space Center's extensive space shuttle launch facilities once the spaceships are retired later this year. The request for information and notice of availability formally begin the process of finding a future tenant for two launch pads, the 52-story Vehicle Assembly Building, three space shuttle hangars and the space center's 15,000-foot-long runway. The infrastructure may become available after the end of the space shuttle program. The Launch Complex 39 facilities are "well-suited for entities operating or directly supporting government or commercial launches or space user services," a NASA statement said. NASA

will get first rights to retired shuttle facilities for government-run programs, such as the heavy-lift rocket the agency is being asked to develop by Congress and the White House. Leftover infrastructure could be shared with other private and public organizations in partnership agreements, according to Monday's announcement. "Kennedy has been working for some time to enable commercial space activities at the center that are in line with NASA's mission," said Bob Cabana, director of the Kennedy Space Center. "Partnering with the commercial space industry will help NASA meet its goals and help sustain facility assets to support our nation's space objectives." NASA has received previous commercial interest in KSC facilities. Private groups already use the center's shuttle landing strip and commercial operators have studied recycling the shuttle's cavernous assembly building and launch pad for manned rocket flights. United Launch Alliance has considered processing and launching potential crewed missions from retired and modified shuttle facilities instead of from existing Atlas and Delta pads at Cape Canaveral, Fla. But no company has committed to flying missions from Complex 39. The public release comes as contractors demolish towers at one of the spaceport's launch pads and as NASA turns over some of its spaceflight responsibilities to the private sector. The deconstruction started in September and was supposed to be finished this month, but a snag in the availability of heavy equipment has delayed the end of demolition until around April 1, according to Allard Beutel, a NASA spokesperson. Beutel said the schedule slip does not impact any future development at the pad and will not cost NASA any additional money. The space agency's demolition contract with LVI Environmental Services Inc. of New York is worth $1.3 million. Once the structures are gone, NASA will continue upgrading the storied launch pad to be ready for more rocket flights by 2014. Engineers continue working with specifications to host the mobile launch tower for the now-cancelled Ares 1 rocket, but they say the new 390-foot-tall structure could be redesigned to help prepare other vehicles for blastoff. Nearby pad 39A remains in service for the final few space shuttle flights. Pad 39B's last launch was the Ares 1-X test flight in October 2009, so it is several years ahead of pad 39A in demolition and rework for future programs. The VAB and orbiter hangars will also be occupied by the shuttle program through at least the end of 2011. Web posted. (2011). [NASA seeking tenants for Florida launch facilities [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, January 24].]

**NASA Honors Crews of Apollo 204, Challenger and Columbia**

This year is the 25th anniversary of the Challenger tragedy and a separate event will be held on January 28 at Kennedy Space Center (KSC). Speakers will include NASA Associate Administrator for Space Operations Bill Gerstenmaier; June Scobee Rodgers, widow of Challenger commander Dick Scobee; Robert Cabana, former astronaut and KSC Director; and Michael McCulley, former astronaut and chairman of the Astronauts Memorial Foundation, which is sponsoring the event. Mrs. Rodgers and members of the other Challenger families created the Challenger Center for Space Science Education whose vision is "to create a scientifically literate population that can thrive in a world increasingly driven by information and technology." Web posted. (2011). [NASA Honors Crews of Apollo 204, Challenger and Columbia [Online]. Available WWW: http://www.spacepolicyonline.com/ [2011, January 24].]

**Discovery rollout set for Jan. 31**

Shuttle Discovery is expected to return to the launch pad a week from today as repairs to its external tank near completion this week. Kennedy Space Center teams plan to begin Discovery's slow crawl to pad 39A at 8 p.m. next Monday , weather permitting. As with the shuttle's September move to the pad, which was then expected to be its last, the time was set to allow hundreds of center employees an opportunity to see the shuttle up close and celebrate its final mission. Xenon lights will illuminate the shuttle again as it exits the 52-story Vehicle Assembly Building atop an eight-tracked crawler-transporter. The 3.4-mile trek called a "rollout" typically takes six or seven hours. Rollouts generally start around midnight to catch the best weather. But as the three shuttles prepare for their final flights and layoffs at the center continue, KSC is organizing "morale events" to let more employees and their families get close to the vehicles and pay their respects. Discovery stood ready for launch in November when cracks were found on some

external tank support beams. The shuttle rolled back to the assembly building Dec. 21. Cracks have been repaired on five of the 108 support beams called stringers on the tank's mid-section. Managers decided to strengthen the tops of another 94 stringers with small metal strips to add stiffness and reduce the chance of cracks forming. Discovery and a crew of six are targeted to launch Feb. 24 to the International Space Station on an 11-day mission. Astronaut Steve Bowen was just added to the crew last week to replace Tim Kopra, who was injured in a cycling accident. Endeavour and Atlantis are tentatively scheduled to fly April 19 and June 28, respectively, before the shuttle program ends. Web posted. (2011). [Discovery rollout set for Jan. 31 [Online]. Available WWW: http://www.floridatoday.com/ [2011, January 24].]

**January 25: NASA's Kennedy Space Center: Visualizing the Possibilities**

For nearly half a century Kennedy Space Center has been the launch site for every U.S. human space flight, evolving over time to meet the changing needs of America's space program. In that time, NASA has built dozens of facilities within KSC to support the engineering and construction of rockets, capsules, launch pads and components of other varied projects. Tracey Kickbusch's 10-person team of civil servants and Boeing workers, known as the Design Visualization Group, or DVG, is applying the lessons of the past to determine the best way to handle spacecraft of the future. The group uses 3D simulation to plan and modify procedures ranging from covering a satellite with a fairing, to developing the route for a multi-vehicle support convoy without moving a piece of real equipment or risking any flight hardware. These virtual world sessions also show how unexpected events can be dealt with effectively and in some cases prevented. "Our goal is to support the customer's ability to achieve a successful operation the first time through," Kickbusch said. The simulations allow the group to work through the considerable challenges involved with processing future rockets and spacecraft in facilities built before some of the designers were born. At the heart of this simulation process, Kennedy's DVG relies on Dassault Systèmes DELMIA to conduct its simulations. The group has modeled dozens of facilities and support equipment within the virtual world allowing them to move equipment around and test designs and procedures. These simulations can help answer questions ranging from where to place a swing arm on a launch tower to how member support team members can be inside a spacecraft as they help astronauts strap in for launch. The group's extensive library, made up of computer models built from a number of different computer-aided designs from engineers all over Kennedy, can be updated with laser scans of particular pieces of equipment to ensure safety or plan reutilization of an unused item. "Being able to repurpose old equipment saves time and money," Kickbusch said. Integrated into current and proposed programs, the Design Visualization Group is showing that 3D simulations can be as valuable for the ground operations team as blueprints are for an architect. Web posted. (2011). [NASA's Kennedy Space Center: Visualizing the Possibilities [Online]. Available WWW: http://www.industryweek.com/ [2011, January 25].]

**January 27: Endeavour's external tank will get Discovery-like modifications**

Discovery remains on track to roll back out to the launch pad Monday evening as technicians at Kennedy Space Center wrap up months of work on the shuttle's external tank today and tomorrow. As repairs and modifications to roughly 100 support beams called stringers near completion, the shuttle program today approved similar work on the next tank scheduled to fly, with Endeavour in April. The tank labeled ET-122 was built before Discovery's tank and refurbished after sustaining damage during Hurricane Katrina. Stringers lining the tank's ridged mid-section are not made of a more brittle aluminum-lithium alloy that cracked on Discovery's tank. But managers decided reinforcing the tops of the stringers with small metal strips called radius blocks would reduce uncertainty and do no harm. Schedules will be arranged to preserve the option of performing a tanking test after the shuttle rolls out to the pad. Endeavour's rollout for a targeted April 19 launch was anticipated in early March. Web posted. (2011). [Endeavour's external tank will get Discovery-like modifications [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, January 27].]

**January 29: Giffords's Husband Faces Decision on Shuttle Flight**

Captain Kelly, a Navy officer who flew 39 combat missions in the Persian Gulf war, is scheduled to fly the shuttle Endeavour on a two-week mission to the International Space Station in April. With his wife at the beginning of a long and arduous rehabilitation program to recover from a gunshot wound to the head, Captain Kelly and his bosses at NASA will have to determine whether he can maintain the training regimen in the weeks leading up to the launching and command the mission. It would be Captain Kelly's fourth trip to space, but with the shuttle program winding down, giving up this flight would almost certainly mean also giving up his last chance to command a shuttle mission. No shuttle commander has ever been removed so close to a launching. "We're not there yet," Stephanie Schierholz, a NASA spokeswoman, said of when Captain Kelly and NASA's leadership would decide. While working through the decision, NASA has kept its options open by naming a backup commander for the mission, Frederick W. Sturckow. Captain Kelly, who is on leave, said in the NASA announcement of a backup commander that he had recommended the step "to prepare to complete the mission in my absence, if necessary." But he added that he was "very hopeful that I will be in a position to rejoin" the crew. The ultimate decision involves weighing Captain Kelly's determination to achieve a goal he has trained so long for and the needs of his family, as well as NASA's need to have a commander whose concentration and focus are unwavering and the cohesiveness of a crew that has worked closely to achieve a common goal. NASA has no rigid rules about removing crew members from missions. Web posted. (2011). [Giffords's Husband Faces Decision on Shuttle Flight [Online]. Available WWW: http://www.nytimes.com/ [2011, January 29].]

**NASA Apollo 14 40th anniversary celebration**

The Astronaut Scholarship Foundation hosted a celebration of the 40th anniversary of the Apollo 14 mission. Edgar Mitchell was celebrated, as were his fellow Apollo 14 crew, the late astronauts Alan Shepard, first American in space, and Stuart Roosa. The event was held at the Kennedy Space Center at Cape Kennedy, Florida on January 29th. Among the attendees were Neil Armstrong, Gene Cernan, Dave Scott, Fred Haise, Tom Stafford, Walt Cunningham, Al Worden and other astronauts from the Apollo space program. The Astronaut Scholarship Foundation provides scholarships for college students who exhibit exceptional performance in the science or engineering field of their major. Web posted. (2011). [NASA Apollo 14 40th anniversary celebration [Online]. Available WWW: http://www.cnn.com/ [2011, January 30].]

**January 30: NASA making final preparations to rollout Discovery**

Workers at NASA are making final preparations to once again roll space shuttle Discovery out to the launch pad. Discovery was on the pad, ready for liftoff, in November when cracks were found on the external fuel tank. That forced crews to roll the orbiter back into the vehicle assembly building for repairs. NASA said it has now repaired cracks on five different supports beams on the tank. The rollout is set to happen Monday at 8 p.m. If all goes according to plan, Discovery will launch on it's final scheduled mission on Monday, Feb. 24. Meanwhile, with the end of the shuttle program still slated for this year, NASA is looking for possible tenants at the Kennedy Space Center. Former Astronaut Bob Springer likes the idea and said, "It's actually a very clever way to taking that next step and leading into the future." Springer said it's a great idea to be able to use billions of dollars of investments that have been accumulated over the years and a good way to deal with the budget issues. NASA came out last week and said the facilities at the space center are available to commercial space businesses even after the space shuttles stop flying. The spaces include launch pads, the vehicle assembly building and the shuttle landing strip. Web posted. (2011). [NASA making final preparations to rollout Discovery [Online]. Available WWW: http://www.cfnews13.com/ [2011, January 30].]

## FEBRUARY

**February 1: 8 years since space shuttle Columbia disaster**

Even though this is the 25th anniversary of Challenger, Feb. 1 will always be the day NASA lost another seven and the first orbiter of the space shuttle program. On Feb. 1, 2003, space shuttle Columbia disintegrated on re-entry killing all seven aboard at the end of STS-107, bringing on the second halt to the space shuttle program. Web posted. (2011). [8 years since space shuttle Columbia disaster [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, February 1].]

**Shuttle Discovery returns to launch pad after tank repairs**

With repairs to its external tank complete, engineers began hauling the shuttle Discovery back to launch pad 39A Monday evening for work to ready the ship for blastoff Feb. 24 on a flight to deliver critical spare parts, supplies and a final U.S. module to the International Space Station. Carried by a powerful crawler-transporter, Discovery and its mobile launch platform began slowly rolling out of NASA's Vehicle Assembly Building at 7:58 p.m. EST, witnessed by scores of Kennedy Space Center workers who gathered nearby to watch what is expected to be Discovery's final trip to the pad. The shuttle reached the launch complex and was secured at 2:53 a.m. Tuesday. "I have full confidence we've done everything we need to do on that tank," Stephanie Stilson, the engineer in charge of Discovery's ground processing, told CBS News. "Seeing those guys work and knowing how hard they worked to do the modifications, I have confidence in the way the shuttle program works and the fact that they're always investigating and asking more questions, more so than I've ever heard in the past." Shuttle program managers plan to conduct a flight readiness review Feb. 10, followed by an executive-level review by senior NASA managers Feb. 18. Assuming no additional problems develop, the agency hopes to restart Discovery's countdown at 3 p.m. Feb. 21, setting the stage for launch Feb. 24 at 4:50:19 p.m. NASA originally hoped to launch Discovery on its 39th and final flight Nov. 1, but the mission was repeatedly delayed, first by relatively minor technical problems that pushed launch to Nov. 5 and then by a gaseous hydrogen leak in a vent arm attached to the external tank. The hydrogen leak was quickly resolved, but engineers also discovered cracks in structural rib-like "stringers" in the shuttle's external tank that triggered what turned into a nearly four-month delay. After an instrumented fueling test Dec. 18, Discovery was hauled back to the Vehicle Assembly Building for X-ray inspections of the backside of the tank, which engineers could not carry out at the pad. Additional cracks were found in three stringers, prompting NASA managers to order installation of "radius-block" doublers on most of the remaining intertank stringers. When all was said and done, five cracked stringers were repaired using a combination of doublers and radius blocks and 94 were modified with radius blocks alone. Nine stringers were not modified, one because of access issues and eight others because they were made from a different lot of aluminum-lithium alloy. As if the crack problem wasn't enough of a headache for NASA, one of Discovery's crew members -- flight engineer Timothy Kopra -- was injured in a bicycle mishap in Houston Jan. 15. He was replaced by veteran astronaut Stephen Bowen, who will take Kopra's place in two planned spacewalks. Bowen and his crewmates -- Commander Steven Lindsey, pilot Eric Boe, Nicole Stott, Michael Barratt and spacewalker Alvin Drew -- plan to fly to the Kennedy Space Center on Feb. 20 for the start of their countdown to launch. Web posted. (2011). [Shuttle Discovery returns to launch pad after tank repairs [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, February 1].]

**February 2: Robonaut 2 to Appear on Fox's Super Bowl XLV Pregame**

Robonaut 2, the muscular humanoid robot created by General Motors and NASA, will make a guest appearance with Fox Sports analyst Howie Long during the Fox Network pre-game show before Super Bowl XLV on Sunday. Robonaut 2, or R2 as he is better known, was developed to assist the astronauts on the International Space Station and to help GM develop safer cars and plants. R2's twin is packed aboard the space shuttle Discovery awaiting a launch from Kennedy Space Center currently scheduled for

Feb. 24. R2 took a break from his duties at the NASA Johnson Space Center in Houston, where he learning new skills that eventually will be uploaded to his brother on the space station. Web posted. (2011). [Robonaut 2 to Appear on Fox's Super Bowl XLV Pregame [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, February 2].]

**Natural gas leak forces Space Center evacuation**

Hundreds of people were evacuated from several buildings at Kennedy Space Center because of a natural gas leak. NASA spokesman Allard Beutel said the early Wednesday leak was caused when a backhoe struck a natural gas line. As a precaution, workers were evacuated from facilities including two Orbiter Processing Facilities, which are the hangars for the space shuttles Atlantis and Endeavor. Beutel says there were no injuries or damages and everyone is back at work. Crews are working on the natural gas line. Three more space shuttles missions are planned this year before the program is retired. The shuttle Discovery is next, with a launch scheduled for Feb. 24. Web posted. (2011). [Natural gas leak forces Space Center evacuation [Online]. Available WWW: http://news.yahoo.com/ [2011, February 2].]

**Space station production plant could bring 2K jobs to Brevard**

The state of Florida and the Space Coast could land a new commercial space station production plant that would employ between 1,500 and 2,000 later this decade, the president of an entrepreneurial space firm said Wednesday. Florida's long history of spaceflight, skilled labor pool and plethora of existing facilities put the state in position to launch scores of outpost assembly and servicing missions starting in 2015. But it's still not a sure thing. "If I was to say, 'Should the missions launch from Florida? The logic says 'Yeah, they ought to,' " said Robert Bigelow, president of Bigelow Aerospace, who came to Cape Canaveral to talk to about 150 community leaders Wednesday. "Now, can the politics screw it up? You bet it can. Or maybe somebody raises more (economic development incentive money) than somebody else does and has the kind of facilities people like our company need to have in terms of executing their business." Bigelow Aerospace plans to launch the company's first commercial space station in 2015 and open it for business the following year. The assembly sequence calls for seven launches and another six per year will be required to send up astronaut crews and cargo. A second, much larger space complex is to be launched and assembled in 2017. Space Florida and Bigelow Aerospace signed an agreement Wednesday to build a spacecraft exhibit that will give politicians and economic development officials a glimpse of the future. Bigelow Aerospace already has two prototype space station modules flying low Earth orbit. Web posted. (2011). [Space station production plant could bring 2K jobs to Brevard [Online]. Available WWW: http://www.floridatoday.com/ [2011, February 3].]

**February 3: NASA weighs plan to keep space shuttle until 2017**

NASA is considering a plan to keep the space shuttle Endeavour in flight-like condition after its last scheduled mission, a move that could lead to its transformation into a privatized spaceship rather than a museum piece. Endeavour's continued operation through 2017 is part of a proposal that could receive millions of dollars in development funds from the space agency next month. The proposal — called Commercial Space Transportation Service, or CSTS — would use Endeavour as well as a sister shuttle, Atlantis, to fly two missions a year from 2013 to 2017 at an annual cost of $1.5 billion. United Space Alliance, the contractor that currently manages the shuttle program on NASA's behalf, has offered the proposal for the second round of funding from the space agency's Commercial Crew Development initiative, also known as CCDev 2. NASA could award as much as $200 million in the second round of the CCDev initiative. During the first round, the agency distributed $50 million in stimulus funds to five companies to advance the development of crew-capable replacements for the shuttles. Some of the recipients of first-round funding — such as the Boeing Co. and Sierra Nevada Corp. — have made proposals for second-round funding as well. The second-round competitors also include SpaceX and Orbital Sciences, which are already receiving NASA funds to build spacecraft for transporting cargo to the space station. United Space Alliance is the only venture proposing to keep the shuttles operating rather than retiring them this year, as currently planned. United Space Alliance says its plan would take

advantage of shuttle infrastructure and a workforce already in place. Some shuttle production lines would have to be restarted — for example, the operation that builds the shuttle's external fuel tanks. But USA says the first commercial shuttle flights could take place in 2013. That would beat the 2016 deadline specified in last year's legislation, as well as the development schedule laid out by SpaceX and USA's other commercial competitors. SpaceX founder Elon Musk has said a Dragon capsule capable of carrying up to seven passengers could be developed at a cost of $1 billion over three years. Seats on the Dragon could be sold to NASA at a price of $20 million per seat, Musk has said. Web posted. (2011). [NASA weighs plan to keep space shuttle until 2017 [Online]. Available WWW: http://www.msnbc.com/ [2011, February 3].]

**Former shuttle worker investigated in theft of shuttle tiles for resale**

Federal and local authorities are investigating the alleged theft and resale of space shuttle tiles from Kennedy Space Center, which triggered a raid this week on a Port St. John home owned by a former shuttle employee who previously had access to the tiles. Brevard County Sheriff's Office Sgt. David Marich said the homeowner is a suspect in the case, but has not been charged. The former employee at one time had access to tiles in his previous job with shuttle contractor United Space Alliance. Marich said he allegedly took tiles destined for disposal off KSC property and advertised them for sale on eBay, with prices reaching as high as $880 per tile. "Evidence was seized from the house" during a raid Tuesday afternoon and evening, Marich said today, although he declined to elaborate. Marich said the suspect has no criminal record. His wife, who also formerly worked at United Space Alliance, is not under investigation, Marich said. Web posted. (2011). [Former shuttle worker investigated in theft of shuttle tiles for resale [Online]. Available WWW: http://www.floridatoday.com/ [2011, February 3].]

**February 4: United Space Alliance to lay off 548 at KSC**

United Space Alliance today completed notifying 548 Kennedy Space Center employees that they will be laid off on April 8. Some 697 USA employees companywide will be laid off that day, a figure that includes 145 in Houston and four in Huntsville, Ala. The Houston-based company, which in early January cut 143 positions at KSC, had previously announced that it expected a layoff of around 700 people in April. Notifications, either in person or by mail, began earlier in the week and were to be complete today. There are no further scheduled layoffs until after the last shuttle flight, USA spokesperson Kari Fluegel said. "However, that could change," she added. USA offers all laid off employees severance packages of four to 26 weeks of pay, based on years of service. Some also are eligible for a "critical skills" bonus that adds another 15 to 26 weeks of pay. While Florida's unemployment rate stabilized at 12 percent in December, the KSC job losses could cause a turnaround in Brevard County, where the jobless rate fell to 11.9 percent in December from 12.6 percent in November. The January rate is due out Feb. 25. The layoffs are part of long-planned work force reductions as a result of the shuttle program nearing its final flight this year. NASA plans three more shuttle missions prior to fleet retirement. Shuttle Discovery is set for launch Feb. 24. Endeavor could launch April 19. The final flight is slated to launch June 28 with shuttle Atlantis. USA, the lead shuttle contractor, employs 6,350 people, including about 3,900 in Florida. Web posted. (2011). [United Space Alliance to lay off 548 at KSC [Online]. Available WWW: http://www.floridatoday.com/ [2011, February 4].]

**NASA Astronaut Mark Kelly Resumes Training For STS-134 Mission**

NASA astronaut Mark Kelly will resume training as commander of the STS-134 space shuttle mission on Monday, Feb. 7. With the exception of some proficiency training, Kelly has been on personal leave since Jan. 8 to care for his wife, congresswoman Gabrielle Giffords, who was critically wounded in a Tucson, Ariz. shooting. "I am looking forward to rejoining my STS-134 crew members and finishing our training for the mission," Kelly said. "We have been preparing for more than 18 months, and we will be ready to deliver the Alpha Magnetic Spectrometer (AMS) to the International Space Station and complete the other objectives of the flight. I appreciate the confidence that my NASA management has in me and the rest of my space shuttle crew." Astronaut Rick Sturckow, the backup commander for the mission, will

resume his role as the deputy chief of the Astronaut Office. ["NASA Astronaut Mark Kelly Resumes Training For STS-134 Mission," **NASA News Release #11-036**, February 4, 2011.]

**Rising Engine Costs, Uncertainty Drive Up Atlas 5 Prices for NASA**

Rising propulsion costs, demand uncertainty and an eroding industrial base are the drivers behind what NASA says is a significant price increase for the Atlas 5 rocket, which is used to launch the agency's most valuable scientific payloads, according to industry and NASA officials. Industry officials said the winding down of the space shuttle program has led to higher prices for the RL 10 upper-stage engine, the second-most-expensive component on the Atlas 5, which is built by United Launch Alliance (ULA) of Denver, a Boeing-Lockheed Martin joint venture. The RL 10 is manufactured by Pratt & Whitney Rocketdyne of Canoga Park, Calif., which also builds the space shuttle's main engines. The ULA-built Delta 4 rocket also uses a variant of the RL 10 as well as a Pratt & Whitney Rocketdyne-built main engine, but this vehicle currently is not used to launch NASA payloads. Jim Maser, president of Pratt & Whitney Rocketdyne, said a number of factors, including lower production rates and changes in the way customers buy propulsion products and services, are driving up costs. Pratt & Whitney Rocketdyne is facing the prospect of its business being "about half of what the shuttle business has been in the past," Maser said, adding that the company is taking steps to reduce its facilities by over half in the next few years. Meanwhile, prices for the Russian-built RD-180, a liquid oxygen/kerosene engine that powers the Atlas 5's main stage, are also on the rise. The RD-180, the single most expensive Atlas 5 component, is built by NPO Energomash of Khimki, near Moscow. Jim Norman, NASA assistant associate administrator for launch services, told the NASA Advisory Council's planetary science subcommittee Jan. 26 that fewer launches, lower production rates, smaller lot buys from suppliers and basic inflation are contributing to higher Atlas 5 costs. Sowers said that price cap will come down if ULA is successful in negotiating a bulk purchase of Atlas 5 and Delta 4 launches with the U.S. Defense Department over a five-year period beginning in October 2012. Web posted. (2011). [Rising Engine Costs, Uncertainty Drive Up Atlas 5 Prices for NASA [Online]. Available WWW: http://www.spacenews.com/ [2011, February 4].]

**February 5: NASA highlights space ship in Boulder**

This year will mark the last time an astronaut will fly to space in a NASA space shuttle. That means, until a new space ship is built here in the U.S., astronauts will have a layover in Russia before they fly into orbit. But NASA is highlighting a Colorado company's efforts to put astronauts in space from U.S. soil so it does not have to book tickets to Russia for long. Saturday, NASA Deputy Administrator Lori Garver visited CU-Boulder's campus to view the Dream Chaser, a seven-person space vehicle, designed and built by a Colorado company, Sierra Nevada Corporation. NASA awarded Sierra Nevada $20 million in stimulus funding in 2010 to spur further design and creation of the space craft, which the company originally announced in 2004. The Dream Chaser is one of several different designs from private companies competing to blast astronauts into space as the Space Shuttle program is retired this year. Web posted. (2011). [NASA highlights space ship in Boulder [Online]. Available WWW: http://www.9news.com/ [2011, February 5].]

**USA shuttle pitch a long shot**

United Space Alliance is preparing a long shot bid to continue flying the shuttle as a commercial service after NASA completes its last three planned missions this year. Starting as soon as 2013, after construction of a new external tank, the lead operator of NASA's shuttle fleet proposes to fly twice a year with Atlantis and Endeavour at a cost of less than $1.5 billion a year. If supported, the plan would reduce an anticipated gap of at least four years between launch of the last shuttle mission this year and availability of new privately run crew taxis, a period during which astronauts will depend on Russian spacecraft to reach the International Space Station. "We thought this was a good option to be put on the table to be evaluated with all the other commercial options, since it's a vehicle that has really proven itself," said Mark Nappi, head of Houston-based USA's Florida operations. "It is safe. We have a lot of

history, we understand how to operate it." To avoid giving the company's employees false hope, however, Nappi has told them the proposal is "very much a long shot." USA initially has proposed a six-month study of the commercial shuttle option, something Nappi noted has been studied a handful of times since the '90s. The company asked NASA to help fund the study under a program set up to speed the development of new rockets and spacecraft able to carry people. Winners of the program's $200 million second round of funding are expected to be announced next month. NASA has refused to comment on any of the companies' bids. USA envisions shuttle flights continuing until at least 2017, or whenever NASA is ready to transition to different commercial vehicles. All three orbiters would be kept, including Discovery for spare parts, rather than being shipped to museums for public display as currently planned by NASA. Nappi said many details need to be studied further, including the terms under which NASA would allow USA to continue operating the nation's shuttle fleet. And a commercial shuttle might fly space tourists or non-NASA payloads that would offset the cost to the government. It could even test systems being developed for other commercial spacecraft. Nappi said he wasn't sure if USA would continue to pursue the business if NASA doesn't fund the commercial shuttle study next month. Web posted. (2011). [USA shuttle pitch a long shot [Online]. Available WWW: http://www.floridatoday.com/ [2011, February 5].]

**February 6: Orbital's Minotaur I launches with NROL-66**

Orbital Sciences Corporation has launched a Minotaur I from Vandenberg Air Force Base in California on Sunday, carrying a classified technology development satellite for the United States National Reconnaissance Office. The mission, designated NRO Launch 66, was re-scheduled from Saturday due to technical issues. Web posted. (2011). [ Orbital's Minotaur I launches with NROL-66 [Online]. Available WWW: http://www.nasaspaceflight.com/ [2011, February 6].]

**Up for grabs? Private companies eye KSC facilities**

The Kennedy Space Center site where some of the greatest shuttle payloads were prepared for launch, including the Hubble Space Telescope and interplanetary probes, is now a patch of grass. The Vertical Processing Facility was mothballed after the Columbia disaster when the shuttles began flying only International Space Station components. Last year, with no prospective tenants and high costs to bring it up to code, the facility built in 1964 was razed without ceremony. "It was just not on anybody's radar screen as being a viable facility for reuse," said Jim Ball, deputy manager of Kennedy's Center Planning and Development Office. "At the end of the day, it made more sense to knock it down." As the shuttle program nears retirement, KSC officials are evaluating whether other facilities that supported three decades of shuttle flights will transition to serve new vehicles or be discarded. The center is offering use of its launch pads, runway, Vehicle Assembly Building high bays, hangars and firing rooms to private companies expected to play a bigger role in NASA missions and a growing commercial space market. The hope is that KSC will become a hub where many rockets and spacecraft fly government and commercial missions, spurring job growth on the Space Coast and offsetting losses from the shuttles' retirement. But matching infrastructure with the new mission isn't as simple as turning over the keys. And commercial operators working to reduce spaceflight costs might decide KSC's aging facilities aren't the best fit, costing too much to refurbish, operate and maintain. "We want to have substantial operations there and use the facilities, but part of that is going to be, is there a rational way for us to pay for those facilities?" said Mark Sirangelo of Sierra Nevada Corp., whose Dream Chaser space plane is a contender to fly NASA crews. Sirangelo and competitors have visited Florida in recent months to tour facilities and plan local operations they'd set up if they win contracts to taxi astronauts to the International Space Station. Discussions began a year ago but have become more detailed as NASA prepares to announce next month the winners of a $200 million second round of funding for commercial vehicle development. Representatives from KSC, Cape Canaveral Air Force Station and Space Florida are helping the companies model how their operations could work economically in and around the space center. For example, space planes proposed by both Sierra Nevada and Orbital Sciences Corp. could be prepared for flight in hangars now housing shuttle orbiters, and land on the shuttle runway. Manufacturing and

processing of crew capsules being developed by The Boeing Co. and SpaceX might be performed in an increasingly empty high bay where space station hardware has been processed. By law, NASA can't just give away its vacant space but must charge a market rate. Companies want to know if they'll be charged for a full year even if they only need a facility part-time to prepare for one or two missions, and whether the access would be exclusive or shared. KSC has already begun or completed some upgrades under NASA's canceled Constellation program. Kennedy is dismantling one of its two shuttle launch towers, planning to create a "clean" launch pad from which multiple kinds of rockets could lift off. And with $35 million in state funds, the Operations and Checkout Building's high bay was refurbished for assembly of the Orion crew capsule by Lockheed Martin work that could continue as part of NASA's heavy-lift rocket project. Web posted. (2011). [Up for grabs? Private companies eye KSC facilities [Online]. Available WWW: http://www.floridatoday.com/ [2011, February 6].]

**February 7: NASA says its pockets not deep enough for new rocket**

The marching orders from Congress and the White House to NASA were pretty straightforward. Go out and build a new big rocket to replace the retiring space shuttle fleet. Unlike the shuttle, the new rocket has to be powerful enough to get out of low Earth orbit and carry humans to an asteroid and eventually Mars, perhaps even the moon. There must also be a test flight by 2016. But at this point, NASA officials are warning of a potentially devastating setback to future space exploration. Its first new rocket in 40 years may not happen because the agency doesn't think the $8 billion budgeted over the next three years is enough. Congress has already responded that unless NASA can prove there's not enough money, the rocket must -- by law -- be built. Sen. Bill Nelson, D-Florida, a key space agency supporter, was adamant when he spoke to CNN: "NASA must stop making excuses and follow this law. I believe the best and brightest at the space agency can build upon the $9 billion we've already invested in advanced technology to design a new heavy-lift rocket, while taking a stepping-stone, pay-as-you-go approach." After the last shuttle flight later this year, NASA will be out of the space taxi business. Commercial companies are expected to take over ferrying astronauts to and from the International Space Station. NASA, no longer burdened with an aging vehicle and costly flights, has again been told to focus on building a new rocket. NASA says it will tell Congress by the spring or early summer whether the rocket can be built with the money available and meet the 2016 deadline. Web posted. (2011). [NASA says its pockets not deep enough for new rocket [Online]. Available WWW: http://www.cnn.com/ [2011, February 7].]

**NASA Eyes Spaceplanes For Crew Transport**

Private industry could be prepared to go where NASA fears to tread and develop a spaceplane to replace the space shuttle and ferry crews to and from the International Space Station. But if industry succeeds, it will be thanks to decades of work by the space agency on lifting-body reentry vehicles. While its plans for replacing the shuttle are in flux, NASA has a small program underway intended to stimulate private-sector efforts to develop commercial human spaceflight services. While most of those involved are pursuing Apollo-style capsules similar to NASA's Orion crew vehicle, one is designing a spaceplane. The Dream Chaser, developed by Sierra Nevada Corp. subsidiary SpaceDev, is based on NASA's HL-20 lifting-body design, which reached the stage of a full-scale research model before work was discontinued in the early 1990s. With NASA now considering bids for a second round of the Commercial Crew Development (CCDev) program, another spaceplane contender has emerged. The "blended lifting-body" vehicle proposed by Orbital Sciences Corp. for CCDev 2 is based on the larger Orbital Space Plane (OSP) the company designed in the early 2000s under NASA's Space Launch Initiative, a previous but abortive effort to develop a next-generation reusable launch system to replace the shuttle. Both proposals draw heavily on NASA work on lifting-body space vehicles that ran from the late 1950s to mid-1970, then reemerged in the 1990s only to be shelved again. Beginning in 1963, with the plywood M2-F1 glider, and continuing through 1973, with the U.S. Air Force-sponsored X-24, atmospheric flight tests proved a lifting body could be maneuvered and landed safely and accurately. The advantages claimed for a lifting body over a capsule include low reentry deceleration loads, large cross range and a low-impact runway landing. Ironically, as NASA selected a capsule for Constellation in part to save time, both Orbital and

Sierra Nevada say they could fly in 2014, only a year behind the first planned (but unfunded) flight of Lockheed Martin's Orion crew vehicle. Web posted. (2011). [NASA Eyes Spaceplanes For Crew Transport [Online]. Available WWW: http://www.aviationweek.com/ [2011, February 7].]

**Techs will replace seal on vent line connected to Discovery's tank**

With all the focus on repairs to cracked support beams on Discovery's external tank in recent months, it was easy to forget the problem that caused the shuttle's Nov. 5 launch scrub. But Kennedy Space Center technicians will soon be back at work on the hydrogen gas vent line that connects to the tank's mid-section, whose leaking seals have forced multiple launch scrubs since 2009. A successful tanking test Dec. 17 appeared to show that improvements in the line's alignment had resolved the leak issue. Managers, however, have decided as a precaution to swap out one of the seals inside the line's seven-inch quick disconnect device. An analysis determined excess pressure may have been applied to the seal when the line was last disconnected, according to a KSC spokesperson, increasing the potential for a leak. The procedure is not expected to impact Discovery's targeted 4:50 p.m. Feb. 24 launch on an 11-day mission to the International Space Station on Discovery's final flight. After the shuttle returned to the launch pad early Feb. 1, five contingency days were available to handle unexpected technical issues. The line in question vents excess hydrogen to a flare stack near the launch pad so the explosive gas burns off at a safe distance while the shuttle is fueled with a half-million gallons of liquid hydrogen and liquid oxygen. Results from leak checks performed after the vent line was reinstalled last Friday were slightly above normal levels but within allowable limits and NASA said that was not the reason for swapping the seal. Shuttle program managers are scheduled to hold a flight readiness review Thursday. Another review including top NASA officials is expected to follow Feb. 18, when an official launch date and time will be set. If a Feb. 24 launch is confirmed, Discovery's six-person crew would be expected to fly into Kennedy Space Center two days later. Web posted. (2011). [Techs will replace seal on vent line connected to Discovery's tank [Online]. Available WWW: http://www.floridatoday.com/ [2011, February 7].]

**February 8: Senate keeps aeronautics research within NASA**

The Senate kept aeronautics research within NASA in an overwhelming vote today, rather than potentially shifting that responsibility to other agencies. The Senate is debating a policy bill for the Federal Aviation Administration that included a provision to establish an advisory committee to consider transferring civil aeronautics research and development from NASA to the FAA. But Sen. Bill Nelson, D-Fla., proposed an amendment to strip out that language, calling it obsolete after unanimous Senate approval of the NASA policy bill in September. The Senate voted 96-1 to adopt the Nelson amendment and drop the provision. "The sole purpose is to take away aeronautics from NASA," said Sen. Sherrod Brown, D-Ohio. "That is simply unacceptable. It belies the very purpose of NASA in our nation's space and aeronautics mission." Web posted. (2011). [Senate keeps aeronautics research within NASA [Online]. Available WWW: http://www.floridatoday.com/ [2011, February 8].]

**SpaceX Lands Contract To Fly To Moon**

Pittsburgh-based Astrobotic Technology, a Carnegie Mellon University spin-off company, has signed a launch services contract with Space Exploration Technologies (SpaceX) for a Falcon 9 rocket to deliver a lander, small rover and up to about 240 lb. of payload to the surface of the Moon, the company announced Feb. 6. Terms of the contract were not disclosed. Falcon 9 rockets cost between $49.9 million for low Earth orbit missions and $56 million for flights carrying 4,680 kg. (10,320 lb.) to geotransfer orbit, according to SpaceX's website. The company offers a 10% discount to contenders in the Google Lunar X Prize, a competition intended to kindle private space missions. Astrobotic, which is among 21 teams vying for $30 million in X Prize funds, will use the Falcon 9's upper stage for a four-day flight to the Moon. The earliest launch date is December 2013. Web posted. (2011). [SpaceX Lands Contract To Fly To Moon [Online]. Available WWW: http://www.aviationweek.com/ [2011, February 8].]

**Too early to tell if Giffords can attend launch**

The doctor leading Rep. Gabrielle Giffords' rehabilitation says it's too early to tell whether the congresswoman could attend her husband's space launch in two months. Astronaut Mark Kelly will lead the space shuttle's final voyage, a two-week mission to the International Space Station leaving April 19 from Cape Canaveral, Florida. NASA considered replacing him on the trip, but Kelly announced last week he would go and expected his wife to be well enough to see him off. But Dr. Gerard Francisco says doctors would have to decide on a variety of medical issues for that to happen, including whether Giffords can fly and how much noise she can tolerate. The Arizona congresswoman was shot in the forehead a month ago and is recovering at a rehabilitation hospital in Houston. Web posted. (2011). [Too early to tell if Giffords can attend launch [Online]. Available WWW: http://www.wwltv.com/ [2011, February 8].]

**Proposed Private Space Plane Gets Fiery Name: Prometheus**

A private spaceship being proposed by a commercial space company in Virginia to carry astronauts has been given a name steeped in mythology: Prometheus. The veteran aerospace company Orbital Sciences unveiled the official name for its space plane design via Twitter Feb. 1. The spacecraft, which Orbital Sciences is hoping to use to taxi NASA astronauts to and from low-Earth orbit, is the company's bid to fill NASA's astronaut transportation needs after the space agency retires its space shuttle fleet this year. The name is in keeping with Orbital Sciences' Greek mythology theme: The company has rockets called Pegasus, Taurus and Minotaur, for example. Prometheus was the Titan who stole fire from Zeus and gave it to humans. Prometheus would be the second spacecraft under development by Orbital Sciences to serve the growing commercial space market. The company is building unmanned Cygnus spacecraft and Taurus 2 rockets as part of a NASA deal to provide cargo deliveries to the International Space Station. Prometheus is Orbital Sciences' proposal under the second phase of NASA's Commercial Crew Development program (CCDev-2), which aims to advance the crew-carrying capabilities of American private spaceflight firms. NASA began soliciting proposals for CCDev-2 in October and could make funding available in March, NASA officials have said. Orbital Sciences announced in December that it had submitted a proposal. Under its $1.9 billion COTS contract, Orbital Sciences will make eight supply flights using the company's Cygnus capsule and Taurus 2 rocket. Web posted. (2011). [Proposed Private Space Plane Gets Fiery Name: Prometheus [Online]. Available WWW: http://www.space.com/ [2011, February 8].]

**NASA Primes New Satellite to Study Earth's Climate**

NASA is preparing to launch its newest satellite that will monitor how the sun and tiny particles in Earth's atmosphere, called aerosols, affect the planet's climate. Scientists hope the new Glory satellite, which launches this month, will address key uncertainties in climate research by enriching scientists' understanding of manmade and natural aerosol contributions to global climate change. The satellite's onboard instruments will also collect data to enhance scientific models, and could help paint a clearer picture of the causes and consequences of climate change. The spacecraft is scheduled to launch on Feb. 23 at 5:09 a.m. EST (1010 GMT) from Vandenberg Air Force Base in California. It will fly onboard Orbital Sciences Corporation's Taurus XL 3110 rocket. Once in orbit, Glory will slip into the tight formation of a fleet of Earth-observing satellites, called the Afternoon Constellation or "A-train." "The Afternoon Constellation consists of multiple spacecraft flying in close proximity to create the first ever 'super observatory' that will give us near simultaneous observations of the Earth that include land, ocean and atmosphere," Joy Bretthauer, Glory program executive at NASA Headquarters, told reporters in a Jan. 20 news briefing. Web posted. (2011). [NASA Primes New Satellite to Study Earth's Climate [Online]. Available WWW: http://www.space.com/ [2011, February 8].]

**Liberty rocket emerges from shadow of defunct Ares 1**

ATK and Astrium are joining the growing crowd of companies competing for a $200 million pot of NASA seed money to build a commercial vehicle to haul astronauts and cargo to space, proposing to combine proven U.S. and European rockets into a 300-foot-tall behemoth named Liberty. The Liberty rocket would stack the cryogenic core stage of Europe's proven Ariane 5 launcher atop a solid-fueled

motor developed for the Ares rocket. The result is a vehicle closely resembling the Ares 1, the crew launch vehicle cancelled by the U.S. government in 2010. ATK says the privately-built rocket could be operational by 2015. And because it leans on proven rocket technology, the company claims it can launch the Liberty on a test flight by the end of 2013. The Liberty rocket could deliver 44,500 pounds to the International Space Station's orbit, enough capacity to lift any crew vehicle in development, according to Kent Rominger, ATK's vice president of advanced programs. The rush of established aerospace giants and start-up firms is sparking a heated competition for the $200 million prize in the second round of NASA's Commerical Crew Development effort, dubbed CCDev 2. NASA expects to announce the winners in late March. NASA will divide the funding to multiple winners. The Liberty rocket would blast off from Kennedy Space Center on 3.1 million pounds of thrust from ATK's Ares solid rocket, then the Ariane's hydrogen-fueled Vulcain 2 engine would ignite to accelerate crews into low Earth orbit. ATK would base Liberty launch operations at existing KSC facilities, utilizing retired space shuttle infrastructure and the new mobile launch platform partially constructed for the Ares 1 rocket. The Liberty rocket would tower twice as tall as the Statue of Liberty. Web posted. (2011). [Liberty rocket emerges from shadow of defunct Ares 1 [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, February 8].]

**ULA announces progress on crew escape system**

United Launch Alliance today announced completion of demonstration tests of the emergency detection system it is developing under NASA's commercial crew vehicle development program. ULA said it had completed "the most significant portion of the final milestone" of the program's first round with several simulations that showed a launch vehicle successfully alerting a spacecraft to separate in response to emergency conditions. The simulations used multiple combinations of spacecraft with Atlas V and Delta IV rockets, ULA said. NASA next month is expected to announce the winners of a $200 million second round of funding under the Commercial Crew Development program, known as CCDev. Web posted. (2011). [ULA announces progress on crew escape system [Online]. Available WWW: http://www.floridatoday.com/ [2011, February 8].]

**February 9: Minor tank damage on Discovery won't need repair**

Insulating foam on the back side of Discovery's external tank sustained minor damage when pieces of a technician's tool fell from the launch pad Tuesday evening, but no repairs are necessary, NASA reports. A feeler gauge used to take measurements fell apart. Nine of its 13 metal blades fell to various levels of launch pad 39A, including one that reportedly stuck in the side of the tank briefly. No one was injured and all the lost components were located. The shuttle remains on track for a targeted Feb. 24 launch. Shuttle program managers are scheduled to hold a flight readiness review Thursday starting at 9 a.m. EST. Web posted. (2011). [Minor tank damage on Discovery won't need repair [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, February 9].]

**House proposes budget cut for NASA this year**

Leaders of the U.S. House appropriations committee today proposed a $379 million cut to NASA's budget this year compared to the $19 billion President Obama proposed last year. That would leave NASA with about $100 million less than if the 2010 budget levels the government has been operating with so far this year were maintained. NASA's 2010 budget was $18.7 billion. NASA Administrator Charlie Bolden has said previously that a flat budget this year would result in cuts to spending proposed to modernize Kennedy Space Center infrastructure, though NASA intended to fully fund the program in later years. The NASA Authorization Act of 2010 budgeted $428.6 million for launch support and infrastructure improvements this year. It does not appear that the proposed cut, if approved, would derail plans to launch Atlantis as the final shuttle flight this summer, but NASA has not yet said how it will pay for the mission. Web posted. (2011). [House proposes budget cut for NASA this year [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, February 9].]

**Under Scott's budget, Space Florida takes $21M hit**

Funding for Space Florida to improve infrastructure and offer incentives to help lure business to the area would drop significantly under Gov. Rick Scott's proposed budget for the 2011-12 fiscal year. But the agency would compete for a pool of incentive and development funds the governor plans to consolidate, possibly allowing it to recoup some or all of the agency's proposed $21 million cut, a state lawmaker said. Overall, the total budget for the state's aerospace economic development agency would be cut by two-thirds, from $31 million to $10 million, according to the agency. Money for day-to-day operations, work force development and general business development would remain flat, at $3.8 million, $3.2 million and $3 million, respectively. But the governor eliminated dedicated funds for infrastructure improvements and financing assistance used to attract companies and retain jobs, both important tools in the effort to offset thousands of local jobs expected to be lost when the shuttle program ends later this year. Last year, the Legislature provided $11.1 million for launch complex upgrades and early development of the Exploration Park research and development complex outside Kennedy Space Center. Another $10 million was offered for financing assistance to launch services and payload processing providers. That's all gone in Scott's proposal. Lawmakers' legislative session begins March 8 in Tallahassee. Their final budget could look very different than the $65.8 billion spending plan put forward by Scott, which includes $4.6 billion in spending cuts. Last year's $31 million budget was historically high for Space Florida, which received $4 million and $7 million in the two previous years. Web posted. (2011). [Under Scott's budget, Space Florida takes $21M hit [Online]. Available WWW: http://www.floridatoday.com/ [2011, February 9].]

**A budgetary haircut ahead for NASA?**

Congressional Republicans have made a show in recent weeks about their aims to reduce spending in the federal government and a key battlefield is the 2011 budget, which could mean tough times ahead for the nation's space agency. The cuts announced by the appropriations committee call for a $379 million reduction to NASA's budget. A sizable sum if true. But it's another example of what happens when politicians start doing math. Here's why. The $379 million doesn't use the 2010 budget as a baseline. It uses President Barack Obama's proposed 2011 budget as a baseline, which was gave $19 billion to NASA. But that budget never passed. In actual dollars, the $379 million cut would be something closer to $103 million. We get at that figure by subtracting $379 million from Obama's budget ($19 billion minus $379 million) and then subtracting that figure ($18.621 billion) from the 2010 spending level of $18.724 billion. According to a spokeswoman for the House appropriations committee, it would be $103 million over the next seven months. Which means NASA's level of spending for the remainder of 2011 would be slightly lower than $18.621 billion to compensate for the slightly higher level of spending for the first five months. If the new GOP plan becomes law, NASA would get $103 million less than last year. Web posted. (2011). [A budgetary haircut ahead for NASA? [Online]. Available WWW: http://www.orlandosentinel.com/ *the write stuff blog* [2011, February 9].]

**Tool breaks and drops at launch pad, NASA checking for any damage**

NASA is checking space shuttle Discovery to see if it was damaged by a dropped tool. Discovery is supposed to blast off Feb. 24 for the International Space Station after a delay of nearly four months. A NASA spokeswoman said Wednesday that a measuring gauge came apart. The tool may have struck Discovery's external fuel tank as it fell. The mishap occurred Tuesday night during repair work. Spokeswoman Candrea Thomas says the metal gauge is small. It was tethered properly to a worker, but came apart and some pieces fell. This week, workers are replacing a shuttle seal to prevent another hydrogen gas leak. Leaking gas halted Discovery's countdown in November. Fuel tank cracks contributed to the lengthy delay. Web posted. (2011). [Tool breaks and drops at launch pad, NASA checking for any damage to space shuttle Discovery [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, February 9].]

**February 10:** **Damage to Discovery insignificant, NASA says**

Insulating foam on the back side of Discovery's external tank sustained minor damage when pieces of a technician's tool fell from the launch pad Tuesday evening, but NASA said no repairs were necessary. The shuttle remains on track for a targeted Feb. 24 launch to the International Space Station on Discovery's final flight. Shuttle program managers are scheduled to meet this morning to assess the flight's readiness. A follow-up review to set the official launch date is expected Feb. 18 at Kennedy Space Center. KSC officials said a technician 215 feet up the launch pad structure was taking measurements with a feeler gauge when the tool came apart. A screw was supposed to hold together the gauge's 13 metal blades, each the width of a piece of paper. Nine of the blades came loose and scattered to various levels of the pad. One reportedly stuck in the tank briefly before blowing away. NASA said no one was injured during the incident and all the tool components were located. Web posted. (2011). [Damage to Discovery insignificant, NASA says [Online]. Available WWW: http://www.floridatoday.com/ [2011, February 10].]

**House members may come see Discovery launch**

Members of the House space committee talked today about attending the next shuttle launch, a side benefit of their official business. The chairman, Rep. Ralph Hall, R-Texas, said the government would provide a plane if there is enough interest among committee members to attend the Feb. 24 launch of space shuttle Discovery. At an organizational meeting of the committee, he asked lawmakers to sign up by Monday. "It's an exciting thing," Hall said of a shuttle launch. The panel oversees NASA policy, with a hearing scheduled next Thursday on President Barack Obama's budget proposal for the agency. Watching a launch would be a treat for panel members, who often have some particular interest in space flight. For example, the father of Rep. Scott Rigell, R-Va., worked on the Apollo program. Hall, one of NASA's most vocal supporters in Congress, said the committee would have to work together to support the agency amid tight budgeting that will force cuts throughout the government. Web posted. (2011). [House members may come see Discovery launch [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, February 10].]

**Discovery readiness review postponed**

The shuttle program has delayed today's planned flight readiness review for Discovery's mission because of bad weather that delayed the opening of Marshall Space Flight Center in Alabama, NASA reports. The review is now scheduled Friday. Web posted. (2011). [Discovery readiness review postponed [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, February 10].]

**NASA hopes to find money for Taurus 2 test flight**

Bound by restrictions set in a temporary budget resolution, NASA has not yet committed full funding of a risk reduction test flight of the Taurus 2 rocket, one of the launch vehicles the agency hopes will be ready to resupply the International Space Station by the end of this year. NASA and industry officials said Thursday the demonstration launch is a top priority, but the space agency is struggling to find money to pay for the flight. The Orbital Sciences Corp. Taurus 2 rocket is being developed along with the Cygnus cargo freighter to deliver supplies to the space station. The company has a $1.9 billion contract for resupply services with NASA. NASA is also subsidizing the design and development of the Taurus 2 and the Cygnus vehicles, along with a separate SpaceX resupply system that features the Falcon 9 rocket and Dragon spacecraft. The agreement is part of the Commercial Orbital Transportation Services program. Web posted. (2011). [NASA hopes to find money for Taurus 2 test flight [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, February 11].]

**February 11: Ex-shuttle worker: Tile thefts common**

A former shuttle-contractor employee accused of stealing heat-shield tiles and selling them for more than $10,000 on eBay said the thefts were common among his co-workers at Kennedy Space Center. David A. Abbey, 50, of Cocoa was arrested Thursday and charged with grand theft, a third-degree felony punishable by five years in prison, and with dealing in stolen property, a second-degree felony punishable

by 15 years. Abbey, who does not have a criminal record, posted a $10,000 bond and was released from the Brevard County Detention Center. The joint local and federal investigation began last fall, when a Texan who had paid $921.99 for a tile, which NASA listed as missing, asked NASA about its flight history, according to an arrest affidavit. A covert agent for the space agency's Office of Inspector General then purchased one earlier this year from Abbey, who worked until May 2009 as a shuttle tile technician for United Space Alliance. "I'd just put it in my bag and walk out with it," Abbey told investigators, according to the affidavit. "Yeah, we knew it was wrong, but . . . we didn't think it was a big deal because, you know, everybody wants some souvenirs." About 22,000 tiles protect each shuttle during their fiery descent from orbit. Any deemed to be damaged by inspectors are removed, replaced and disposed of by workers at KSC. Each is marked with an identification number for tracking purposes. In online auctions, the tiles were won for bids such as $655.50 and $888. Four that were signed by astronauts could have fetched more. Seven of them were shipped overseas to foreign buyers, in violation of the Arms Export Control Act. Since the investigation became public last week, NASA has been contacted by people who bought tiles from other private parties, wondering if those also were stolen. After the undercover agent for NASA purchased a tile and received a box with Abbey's return address, sheriff's and NASA agents searched his home Feb. 1. Web posted. (2011). [Ex-shuttle worker: Tile thefts common [Online]. Available WWW: http://www.floridatoday.com/ [2011, February 11].]

**Florida Governor Guts Space Business Budget**

Space Florida is putting on a happy face about the spending plan proposed by tea party darling Gov. Rick Scott (R), who wants to cut funding by almost two-thirds for the state agency that aims to develop Florida's aerospace and related businesses. Agency spokeswoman Tina Lange points out that Space Florida's operations budget remains the same — $3.8 million — under the budget unveiled this week by the state's new boss. Scott, a former health-care industry executive who has pledged to create 700,000 jobs in Florida in seven years, unveiled his $66 billion spending plan for the year beginning July 1, 2011, that features corporate and property tax cuts and a $4.6 billion reduction in state government spending. Space Florida has less to say about the governor's budget for its business development programs, money the agency uses to leverage private capital investment. Scott's budget requests $10 million — a cut of $21 million from the agency's $31 million 2010 budget, although Lange said it is possible more money would be added in later as individual initiatives come to fruition. The agency, for example, is pursuing several partnerships to take over facilities at Kennedy Space Center that will become available after the shuttle program ends later this year. "Our operations budget remains the same and that's important to us. That keeps us going. The rest of it, we'll see how it plays out," Lange says. Space Florida already holds leases from the Air Force for use of Launch Complexes 36 and 46 for commercial operators. Potential clients include Masten Space Systems, which is expected to launch a suborbital rocket within three months from Complex 36, and Lockheed Martin, which is partnered with ATK on the Athena booster that would fly from Complex 46. Web posted. (2011). [Florida Governor Guts Space Business Budget [Online]. Available WWW: http://www.floridatoday.com/ [2011, February 11].]

**ATK Awarded NASA's Prestigious George M. Low Award**

Alliant Techsystems, Aerospace Systems was honored to be selected as recipient of NASA's George M. Low 2010 award for its quality and performance on multiple NASA contracts. This selection makes the fourth time the company has been chosen for this prestigious award. The George M. Low Award is NASA's premier quality and performance award for its prime and subcontractors. This award program recognizes large and small businesses that demonstrate excellence and outstanding technical and managerial achievements in quality and performance on NASA-related contracts or subcontracts. "It is an honor to be recognized for our quality, innovation and performance on the work we do for NASA," said Charlie Precourt, vice president and general manager, Space Launch Systems, ATK Aerospace Systems. "It is a tremendous confirmation to our workforce of their dedication to ensuring success, even during challenging times." ATK's NASA programs include space shuttle solid rocket boosters and booster separation motors, Ares I first stage, Orion launch abort system's abort motor, and attitude control solid

rocket motors, optical structures for the James Webb Space Telescope, Orion's UltraFlex solar arrays, and International Space Station structures, among others. Web posted. (2011). [ATK Awarded NASA's Prestigious George M. Low Award for Quality and Performance [Online]. Available WWW: http://finance.yahoo.com/ [2011, February 11].]

**February 12: 'We were lucky': NASA underestimated shuttle dangers**

NASA seriously underestimated the dangers astronauts faced when the shuttle fleet began flying in the early 1980s, a new internal safety study shows. At the time, managers thought there was only a 1-in-100,000 chance of losing a shuttle and its crew. Engineers thought the probability was closer to 1 in 100. But in reality, the odds of a disaster were much higher. . On each of the shuttle's first nine missions, there was a 1 in 9 chance of a catastrophic accident, according to the new risk analysis. On the next 16 flights that led up to and included the January 1986 Challenger disaster, the odds were 1 in 10. NASA lost 14 astronauts in two shuttle tragedies, and saw near misses on a dozen other flights. "We were lucky. There were a number of close calls," NASA summarized in the new risk assessment. NASA's Shuttle Program Safety and Mission Assurance Office at Johnson Space Center in Houston performed the assessment to gauge the progression of risk -- increases and decreases -- over three decades of fleet operations. Doing so could help next-generation rocket and spaceship operators better understand the real level of risk involved in flying astronauts on inherently dangerous missions. NASA, which now plans just three more shuttle flights, will rely on Russia to fly American astronauts to and from the International Space Station for the next several years after that. The U.S. is counting on commercial companies to start flying astronauts on private-sector space taxis by mid-decade, and the new NASA study suggests initial risks will be high. The results of NASA's shuttle risk progression study will be presented at an American Institute of Aeronautics and Astronautics conference in late September. Shuttle managers were briefed on the outcome late last month. Web posted. (2011). ['We were lucky': NASA underestimated shuttle dangers [Online]. Available WWW: http://www.floridatoday.com/ [2011, February 12].]

**House continuing resolution would bar NASA from China ties**

House Republicans want to ban NASA from developing a relationship with China. The nations' suddenly star-crossed space programs are the subject of a funding-limitation provision in a spending measure released by GOP leaders Friday night. The language is the latest salvo in a battle between the White House and congressional conservatives over the future of the U.S. space program. "None of the funds made available by this division may be used for the National Aeronautics and Space Administration or the Office of Science and Technology Policy to develop, design, plan, promulgate, implement, or execute a policy, program, order, or contract of any kind to participate, collaborate, or coordinate in any way with China or any Chinese-owned company unless such activities are specifically authorized by a law enacted after the date of enactment of this division," the bill's drafters wrote. It's a small provision in a big bill that, if enacted, would fund government agencies from March 4 through Sept. 30 at levels $100 billion below those envisioned in President Barack Obama's fiscal 2011 budget. In November, Space News reported that Bolden told an audience that a relationship between the two countries could be mutually beneficial — but that they don't need each other to advance. The prohibition in the House "continuing resolution" goes beyond cracking down on substantive collaboration and forbids NASA from providing for visits by Chinese dignitaries. "The limitation in subsection (a) shall also apply to any funds used to effectuate the hosting of official Chinese visitors at facilities belonging to or utilized by the National Aeronautics and Space Administration," it admonishes. Web posted. (2011). [House continuing resolution would bar NASA from China ties [Online]. Available WWW: http://www.politico.com/ [2011, February 14].]

**February 13: NASA studying request to combine Dragon test flights**

NASA is reviewing data from SpaceX's historic December demo mission of the Dragon capsule before approving the company's request to send its next test flight all the way to the International Space Station. Agency and company officials say the Dec. 8 orbital test of the Dragon spacecraft was successful. NASA

has already paid a $5 million award for the milestone under the Commercial Orbital Transportation Services, or COTS, program, an agreement between the agency and firms developing resupply vehicles for the space station. But NASA officials aren't quite ready to honor SpaceX's public request to combine its next two test flights into a single action-packed mission in July to prove the Dragon's ability to service the space station. "There were a number of observations tracked during the flight that need to be resolved before the next one," said Alan Lindenmoyer, manager of NASA's commercial crew and cargo program at the Johnson Space Center in Houston. "Nothing major, but certainly things that need to be addressed before SpaceX attempts the next demonstration flight." Lindenmoyer said NASA and SpaceX are studying data from the mission in a process leading up to a flight readiness review before the next launch. NASA has also asked SpaceX to submit a proposal to the agency verifying the spacecraft's ability to accomplish objectives of the second and third demonstration flights originally laid out several years ago. The COTS plan calls for a second Dragon test flight to rendezvous with the space station before backing away. A third demo mission was supposed to proceed within about 30 feet of the complex, close enough for the station's robot arm to grapple the craft and attach it to one of the lab's berthing ports. SpaceX wants to consolidate the two flights and fly the next mission to a berthing on the complex. The company says an all-in-one flight would accelerate SpaceX's 12 operational space station resupply missions under a $1.6 billion contract with NASA. Combining the missions would require the Dragon to achieve the goals of both flights, including fuel-burning abort and retreat tests and extensive thruster firings. If the spacecraft is healthy and still has enough propellant, mission controllers could send the capsule closer to the space station for berthing. The space agency expects final documentation from SpaceX in the "coming weeks," then NASA will be ready to decide on the flight test program. Web posted. (2011). [NASA studying request to combine Dragon test flights [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, February 13].]

**Shuttle's close calls**

NASA lost 14 astronauts in two shuttle tragedies that shocked the world: the 1986 Challenger disaster and the 2003 Columbia accident. But few outside the agency realize crews survived close calls on more than a dozen other flights. Here are some examples: * December 1983, STS-9, Columbia: A dual shuttle computer failure during atmospheric re-entry could have led to loss of vehicle control. A rocket fuel fire that ended in explosions on Kennedy Space Center's three-mile shuttle runway threatened flight safety on the same mission. * January 1986, STS-61C, Columbia: A valve failure led to the inadvertent and undetected draining of liquid oxygen from the shuttle's external tank during a scrubbed launch attempt. Had the countdown not been halted for an unrelated problem, the shuttle would not have had enough fuel to reach orbit. A risky emergency landing attempt in Africa would have been required. Then-U.S. Rep. Bill Nelson, D-Melbourne and now a U.S. senator, was aboard. * December 1988, STS-27, Atlantis: Vulnerable shuttle heat shield tiles sustained severe damage when debris broke free from a solid rocket booster nose cap during launch. * January 1990, STS-32, Columbia: An inadvertent thruster firing sent Columbia tumbling through space while the crew was asleep. Had the shuttle been docked at the space station, the thruster firing could have ripped the spacecraft apart. * October 1998, STS-95, Discovery: The drag chute door on the tail of the shuttle fell off at liftoff, striking one of the orbiter's three main engines and creating a breach in the thermal protection system that protects shuttle astronauts during atmospheric re-entry. U.S. Sen. John Glenn, then 77, was onboard. The first American to orbit Earth was returning to space 36 years after his historic 1962 flight. Web posted. (2011). [Shuttle's close calls [Online]. Available WWW: http://www.floridatoday.com/ [2011, February 13].]

**Safety system tested for Atlas and Delta rockets**

United Launch Alliance is seeking funding from NASA this year to finish designing a key safety system for potential commercial crew launches on its Atlas and Delta rocket fleet, officials said last week. The company is human-rating the Atlas 5 and Delta 4 rockets to launch astronauts inside privately-built spacecraft. NASA is partnering with ULA and spacecraft builders to carry U.S. astronauts into orbit by 2015. After receiving $6.7 million from NASA last year, ULA kicked off the design of a health-

monitoring computer to identify rocket failures in time to save crews. George Sowers, ULA's vice president of business development, said the company developed a prototype Emergency Detection System last year and tested the design in a high-fidelity simulation lab in Denver. The company, a joint venture between Boeing Co. and Lockheed Martin Corp., invited NASA officials and astronauts to participate in flight simulations of the Emergency Detection System, or EDS. The system is a computer designed to recognize an impending mishap and trigger an abort to pull astronauts away. The goal, Sowers says, is to have the EDS ready to go when spacecraft builders start launching manned missions on the Atlas 5 or Delta 4. ULA is revamping its existing rockets to launch commercial manned payloads. Boeing and Sierra Nevada Corp. have already issued subcontracts to ULA to begin studying how to launch their proposed spacecraft. Boeing is designing a seven-person capsule named the CST-100, and Sierra Nevada is working on a lifting body space plane called the Dream Chaser. Orbital Sciences Corp. is also interested in launching its proposed Prometheus space plane on an Atlas 5 rocket. Sowers said ULA is working with every potential spacecraft provider except for SpaceX, which plans to launch the manned Dragon capsule on its own Falcon 9 rocket. Orbital and Boeing claim their spacecraft will be ready to launch by 2015. Sierra Nevada says 2014 is the earliest the Dream Chaser will be operational. Web posted. (2011). [Safety system tested for Atlas and Delta rockets [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, February 13].]

**February 14: NASA's New Vision and Mission Statements Revealed in New Strategic Plan**

Together with its FY2012 budget request, NASA released its new Strategic Plan today. The document reveals NASA's new vision and mission statements. NASA's Vision is: "To reach for new heights and reveal the unknown, so that what we do and learn will benefit all humankind." NASA's Mission is: "Drive advances in science, technology, and exploration to enhance knowledge, education, innovation, economic vitality, and stewardship of Earth." Web posted. (2011). [NASA's New Vision and Mission Statements Revealed in New Strategic Plan [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, February 14].]

**NASA's $18.7-Billion Budget: How Much Do You Contribute?**

The Obama Administration just announced its budget proposal for the 2012 fiscal year: The total budget is $3.73 trillion, and $18.7 billion of that will go to funding NASA. But how much are you, personally, contributing to space exploration? We did the math, and it turns out that a little more than half a penny of every federal tax dollar ends up at NASA. That means that a family with the median household income ($49,777 according to the U.S. Census Bureau), which pays $6,629 of federal taxes, pays the space agency ...$33. Web posted. (2011). [NASA's $18.7-Billion Budget: How Much Do You Contribute? [Online]. Available WWW: http://www.spacepolicyonline.com/ [2011, February 14].]

**Budget freeze slows rocket development**

NASA's budget would be frozen for the foreseeable future under the fiscal 2012 spending blueprint President Barack Obama released Monday. The freeze would mean slower rocket development, which is expected to anger members of Congress. The biggest winner in the president's spending plan would be the International Space Station, which already has been extended from 2015 to 2020. Other winners would be earth science — including research on carbon emissions that many lawmakers have criticized — and planetary science, with the launch of a Mars science lab scheduled later this year. But essentially, last year's freeze on overall domestic spending that exempted NASA now covers the space agency, too. By sticking indefinitely with the $18.7 billion the agency received in fiscal 2010, Obama's budget abandons his proposal a year earlier to give the agency an extra $6 billion over five years. Budget documents said NASA will get the money to develop a heavy-lift rocket and crew capsule "to carry explorers beyond Earth's orbit, including a mission to an asteroid next decade—the furthest journey in human history." The president's budget blueprint is only a proposal and will be changed by Congress, and it may be overly optimistic to assume lawmakers will approve even flat funding for NASA. Congress is still debating the agency's funding between March 4, when stopgap spending legislation for the federal

government expires, and Sept. 30, when the fiscal year expires. A House vote is expected later this week. House Republicans have threatened to cut $379 million from NASA's budget, which would give the agency about $100 million less it would get under the freeze Obama has proposed. Under the plan, Kennedy Space Center would have to cut spending on several programs. Web posted. (2011). [Budget freeze slows rocket development [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, February 14].]

**Obama's budget hints at an orbiter at Ohio base**

Wright-Patterson Air Force Base in Ohio would receive $14 million to prepare to house one of NASA's three shuttle orbiters under President Barack Obama's budget. The decision is far from over, and Congress would have to vote on whether to spend the money. Florida and Texas lawmakers have urged repeatedly for orbiters to be placed at Kennedy Space Center and Johnson Space Center. But a page of the Air Force budget released Monday for the year starting Oct. 1 calls for the one-time expenditure to prepare for the delivery of shuttle Atlantis to the National Museum of the Air Force at the Dayton base. "This request in the president's budget is recognition of the integral role Dayton has played in the history of flight," said Rep. Mike Turner, R-Ohio. "From the Wright Brothers' test flights at Huffman Prairie to today's work by the U.S. Air Force at Wright-Patterson, the roots of what made the space shuttle possible can be traced to Ohio." NASA Administrator Charles Bolden will decide where to locate two of the agency's three vessels -- Discovery, Atlantis and Endeavour -- after the shuttle program is retired this year with three final flights. The goal is to locate the orbiters in educational settings such as museums. Discovery is headed to the National Air and Space Museum in Washington. But the competition for the other two orbiters has been hotly contested. Advocates of KSC, which launches the shuttles, and Johnson, which controls the missions, have argued their locations deserve the orbiters because of their history with the program. "We received more than two dozen proposals from museums interested in displaying one of the shuttle orbiters," a NASA spokesman said. "We expect to make a final decision about where these national treasures will be displayed some time in April." Web posted. (2011). [Obama's budget hints at an orbiter at Ohio base [Online]. Available WWW: http://www.floridatoday.com/ [2011, February 15].]

**February 16: European launch may delay shuttle**

A postponement Tuesday in launch of a European supply run to the International Space Station could prompt a delay in the Feb. 24 launch of shuttle Discovery to the same destination. The next opportunity to launch the robotic European cargo carrier from a South American spaceport will come at 4:50 p.m. today. A successful sendoff would push back the Discovery launch until Feb. 25 so Europe's second Automated Transfer Vehicle could dock at the station on Feb. 24. However, the Discovery launch would remain targeted for Feb. 24 if the Ariane 5 rocket launch from Kourou Space Center in French Guiana delays beyond Friday. The complicated launch scheduling is the result of an orbital traffic jam at the station. The Ariane 5 launch with the European carrier -- dubbed Johannes Kepler for the German astronomer and mathematician -- is sandwiched between late-January launches of Japanese and Russian cargo carriers and the Discovery liftoff. The Automated Transfer Vehicles and the Columbus science laboratory are Europe's prime contributions to the 15-nation station project. Web posted. (2011). [European launch may delay shuttle [Online]. Available WWW: http://www.floridatoday.com/ [2011, February 16].]

**House votes to move money from NASA to local law enforcement**

The House voted today to take $298 million away from NASA and spend it on local policing. The vote was 228-203. Reps. Bill Posey, R-Rockledge, and Sandy Adams, R-Orlando, opposed the switch, an amendment to a stopgap spending bill that would keep the government running for the rest of this fiscal year. The debate over the amendment drafted by Democratic Rep. Anthony Weiner of New York illustrates the difficulties that lie ahead in deciding how much to spend on NASA and other agencies. Weiner's amendment would eliminate a fund that NASA taps to work with other agencies and use the

money to hire more community-oriented police officers. The amendment angered NASA supporters. Rep. Frank Wolf, R-Va., said that if it's approved by the Senate and signed into law, it would cost 1,500 to 2,000 NASA jobs. Web posted. (2011). [House votes to move money from NASA to local law enforcement [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, February 16].]

**February 17: Report: NASA could save money with Minotaurs**

The Kennedy Space Center-based program that oversees launches of NASA and other government science satellites could save money by using excess ballistic missiles for some smaller-class launches, the agency's watchdog reported today. Minotaur IV rockets, which utilize government-furnished solid rocket motors from decommissioned Peacekeeper missiles and are launched by Orbital Sciences Corp., are estimated to cost about $63 million per launch, according to NASA's inspector general. In comparison, SpaceX's Falcon 9 would cost $141 million and United Launch Alliance's Atlas V $264 million. The Falcon 9 likely won't be certified to launch the agency's science payloads for several years, and any technical problems could delay missions and increase costs. NASA's options for smaller rockets are more limited because the Department of Defense is no longer using ULA's Delta II, which has launched most of NASA's smaller satellites. In response to the report, NASA's Science Mission Directorate said the KSC-based Launch Services Program already considers using Minotaurs, but that doing so could threaten the viability of the commercial launch industry. It said the Office of Inspector General's report had corrected significant inaccuracies but still included "inaccuracies and inconsistencies in cost estimates." Web posted. (2011). [Report: NASA could save money with Minotaurs [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, February 17].]

**Boeing gives $5 million to Ohio museum hoping for NASA shuttle**

The Boeing Co. is donating $5 million to an Air Force museum in Ohio that a senator hopes will help it acquire one of NASA's retired shuttle orbiters. Boeing's contribution, with three installments, had been planned before the release of President Barack Obama's fiscal 2012 budget. But that spending blueprint proposes $14 million to prepare the museum at Wright-Patterson Air Force Base in Dayton to house the Atlantis shuttle. The foundation for the National Museum of the U.S. Air Force has now raised $20 million to build a 200,000-square-foot building to house presidential aircraft, a space gallery and an array of cargo and tanker planes, foundation officials said. Sen. Sherrod Brown, D-Ohio, said Thursday that the Boeing contribution would help land one of three shuttle orbiters in Ohio. "Boeing's generous donation marks more good news for bringing the shuttle to the Miami Valley," Brown said. "I will continue to work with the Ohio Congressional Delegation on a bipartisan basis to bring the Shuttle to its most suitable home: the Air Force Museum at Wright-Patterson." NASA hasn't decided where to locate the orbiters after the shuttle program's three final flights this year. But dozens of locations, including Kennedy Space Center in Florida and Johnson Space Center in Texas, are competing with the Air Force Museum to house orbiters in an educational setting. NASA Administrator Charles Bolden will decide where to place the Atlantis and Endeavour orbiters, with an announcement expected in April. The Discovery is headed to the Smithsonian Institution's Air and Space Museum. Web posted. (2011). [Boeing gives $5 million to Ohio museum hoping for NASA shuttle [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, February 17].]

**Bolden: Commercial crew good for NASA, KSC**

NASA must make development of commercial crew and cargo transportation a priority to get the most out of the International Space Station, Administrator Charlie Bolden told Florida Today's editorial board today. The Obama administration's proposed 2012 budget for NASA would commit $850 million toward development of commercial vehicles while spending $2.8 billion -- less than was authorized -- on development of a heavy-lift rocket and capsule for exploration. Bolden said transitioning to commercially operated space taxis would help reduce infrastructure costs, noting that it now "costs us $2 billion a year to keep Kennedy Space Center going whether we're flying the shuttle or not." Bolden said a

program office overseeing the commercial crew initiative would be established soon at KSC. "It's critical to Kennedy," Bolden said, for "employees there to know that, OK, I am now the home of this particular piece of pie." Bolden wouldn't hint at whether the Space Coast was a strong contender to win a retired orbiter for public display. He said he hoped to make an announcement in early spring. Bolden addressed KSC employees today and will participate in Friday's Flight Readiness Review for Discovery's targeted Feb. 24 launch to the station on its final flight. Web posted. (2011). [Bolden: Commercial crew good for NASA, KSC [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, February 17].]

**Discovery Launch Date Review Under Way**

Discovery mission commander Steve Lindsey and his crew are in quarantine in Houston today while senior managers meet in a review that is expected to yield a firm launch date next Thursday for their International Space Station assembly and outfitting mission. The STS-133 astronauts entered quarantine last night, an indication that Feb. 24 indeed will be the launch date selected at the conclusion of the Flight Readiness Review being held here at Kennedy Space Center. Shuttle crews always enter quarantine seven days in advance of launch. The crew includes pilot Eric Boe and four mission specialists: Michael Barratt, Stephen Bowen, Al Drew and Nicole Stott. Stott is one of only three former KSC workers to ascend to the astronaut corps and fly in space. The crew is scheduled to fly to KSC on Sunday. Launch countdown preparations are continuing at KSC today. The standard pre-test briefing was conducted Thursday and NASA aims to pick up a three-day countdown at 3 p.m. Monday. Senior NASA managers will hold a news briefing after the readiness review concludes late this afternoon. No exact time has been set for the briefing. You can watch live coverage in The Flame Trench by clicking the NASA TV box on the right side of the page. Web posted. (2011). [Discovery Launch Date Review Under Way [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, February 18].]

**February 18: Discovery gets a thumbs-up for Thursday launch**

NASA set next Thursday as the firm launch date for six astronauts who will fly shuttle fleet-leader Discovery on its 39th and final flight, officials said Friday. Liftoff is set for 4:50 p.m., about six hours after a robotic European cargo carrier arrives at the International Space Station, which is the shuttle crew's destination. Officials said technicians successfully fixed external tank defects that prompted a three-month, 20-day delay in the 133rd shuttle mission -- one of only three before fleet retirement. Senior managers deemed Discovery safe to launch at the conclusion of an all-day flight readiness review at Kennedy Space Center. Mike Moses, NASA's shuttle launch integration manager, said there was "unanimous consent that we're in a really good posture to fly." "Everything is going really, really well. We're looking forward to the countdown starting Monday and a liftoff next Thursday," added NASA shuttle launch director Mike Leinbach. Mission commander Steve Lindsey and his crew are in quarantine at Johnson Space Center in Houston and will fly to KSC Sunday. The crew includes pilot Eric Boe and four mission specialists: Michael Barratt, Stephen Bowen, Al Drew and Nicole Stott. Also flying up with the astronauts: Robonaut 2, the first humanlike android to be hauled up to the station. Bowen, the first and only submarine officer selected to the NASA Astronaut Corps, is a late addition to the crew. He replaced Tim Kopra after the lead spacewalker was injured in a bicycle accident in mid-January. Stott is only the third former KSC worker to ascend to the NASA Astronaut Corps and fly in space. She worked as a shuttle engineer at KSC for 10 years. Discovery's crew aims to deliver a modified Italian cargo carrier that will serve as a permanent storage unit at the station. The astronauts had been scheduled to launch Nov. 5, but a hydrogen leak kept the crew grounded. Engineers later discovered significant cracks in foam and on underlying metal support beams -- so-called "stringers" -- on the ribbed mid-section of the 15-story external tank. Extensive inspections were carried out, a fuel-loading test was performed, and repair work was done to shore up the beams so that Discovery could be cleared for flight. The shuttle will join five other spacecraft docked at the station. Two Russian Soyuz space taxis are moored at the outpost along with a robotic Japanese cargo carrier and an unmanned Russian re-supply ship. Europe's second Automated Transfer Vehicle -- a cargo carrier the size of a double-decker bus -- is en route to the station.

Discovery's docking Feb. 26 will mark the first time all current "visiting vehicles" have been docked simultaneously at the station. The shuttle crew plans to stay at the station for seven days and then land back at KSC at 12:44 p.m. March 7. Discovery's flight is to be followed by the planned April 19 launch of Endeavour and the June 28 launch of Atlantis. The U.S. will rely on Russia to fly American astronauts to and from the International Space Station until U.S. companies can field next-generation space taxis. NASA says private companies should be ready to fly astronauts to and from low Earth orbit by 2015. Web posted. (2011). [Discovery gets a thumbs-up for Thursday launch [Online]. Available WWW: http://www.floridatoday.com/ [2011, February 19].]

**SpaceX changes focus on rockets**

SpaceX has delayed development of its single engine Falcon 1 rocket, which has lifted off five times from the Central Pacific, to focus on development of its Dragon capsule that has been contracted to carry astronauts and cargo to the International Space Station. The company also plans to speed development of its Falcon Heavy, which could compete with United Launch Alliance for government launches. ULA, which employs about 700 in Brevard County, launches about a dozen rockets a year from Cape Canaveral Air Force Station and Vandenberg Air Force Base in California. "The Air Force (Space and Missile Systems Center) in Los Angeles told us that we needed to fly Falcon Heavy and activate our new launch facilities at Vandenberg (AFB) in order to compete for the (Evolved Expendable Launch Vehicle) contract currently held by ULA," SpaceX Communications Director Kirstin Brost said. The Air Force confirmed that it has given SpaceX guidance for developing the Falcon Heavy. "We do not have a (formal) agreement with SpaceX regarding the development of the vehicle," said an Air Force statement. The Falcon 1 delay affects up to 18 launches under contract to ORBCOMM, which provides satellite text messaging communications to marine interests services from its constellation of 29 satellites in low earth orbit. Despite the stand-down in production of the Falcon 1, the ORBCOMM launches remain on the manifest published on SpaceX's Web site and have not been canceled. Web posted. (2011). [SpaceX changes focus on rockets [Online]. Available WWW: http://www.floridatoday.com/ [2011, February 18].]

**February 20: NASA to launch newest Earth-observation satellite**

NASA is set to launch its latest Earth-orbiting satellite on a $424 million mission to analyze airborne grit spewed by volcanoes, forest fires, smokestacks and tailpipes. The Glory satellite is slated to blast off before dawn Wednesday from Vandenberg Air Force Base aboard a Taurus XL rocket. Once boosted to an altitude of 440 miles (700 kilometers), it will join a fleet of satellites that has been collecting climate data for years. Its main job will be to study fine airborne particles known as aerosols. Smaller than the diameter of a human hair, these ubiquitous specks can track great distances across the globe and are largely responsible for producing hazy skies. Scientists know very little about aerosols and their effect on climate. A better understanding is critical to improving climate models. Dozens of satellites have studied aerosols over the past 50 years. But Glory is designed to make the most accurate aerosol measurements from space by studying how widely distributed they are and their various properties. Besides tracking aerosols in the atmosphere, Glory will also monitor changes in solar activity to determine the sun's effect on climate. Glory will be launched aboard a four-stage Taurus XL rocket built by Orbital Sciences Corp. The mission marks Taurus XL's return to flight after a failure in 2009 that resulted in the loss of a NASA global warming satellite. Glory, which weighs about half of a Volkswagen Beetle, will operate for at least three years. The spacecraft chassis was recycled from a mission that never flew and had to be retrofitted to accommodate the two key instruments. The mission was supposed to fly last November, but a problem with the solar panels delayed launch by three months. Once in low-Earth orbit, Glory will join a convoy of satellites already collecting climate information. The spacecraft's unusual name was derived from an atmospheric phenomenon caused by the scattering of sunlight by water droplets in a cloud. Web posted. (2011). [NASA to launch newest Earth-observation satellite [Online]. Available WWW: http://www.usatoday.com/ [2011, February 20].]

**Discovery crew headed to KSC today**

The six astronauts flying Discovery's final mission are scheduled to fly into Kennedy Space Center later this afternoon. Mission commander Steve Lyndsey, pilot Eric Boe and mission specialists Mike Barratt, Steve Bowen, Al Drew and Nicole Stott are due in around 3:45 p.m. in a fleet of T-38 training jets. The crew and Discovery are scheduled to launch an 11-day mission to the International Space Station at 4:50 p.m. Thursday. The mission's official three-day countdown is expected to begin at 3 p.m. Monday. This morning, a Russian Progress cargo ship was scheduled to undock from the space station, clearing a port for Europe's Johannes Kepler resupply ship, which launched last Wednesday and plans to to dock hours before Discovery's launch Thursday. Web posted. (2011). [Discovery crew headed to KSC today [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, February 20].]

**February 21: NASA Picks Up Shuttle Countdown**

NASA picked up the countdown today to the planned launch Thursday of shuttle Discovery and a crew of six astronauts on the orbiter's 39th and final flight. A staff of about 150 to 200 engineers were called to their stations in Firing Room 4 of the Launch Control Center at Kennedy Space Center at 2:30 p.m. Countdown clocks started ticking backward from the T-Minus 43 hour mark at 3 p.m. There is about 27 hours of built-in hold time in the countdown -- time available to catch up on launch preparations or work any technical problems. Liftoff is set for 4:50 p.m. Thursday -- the middle of a 10-minute opportunity to put Discovery and its crew on course for a rendezvous and docking at the International Space Station. NASA Test Director Jeff Spaulding told reporters earlier today that all work leading up to the countdown went smoothly. Kathy Winters, the shuttle weather officer with the Air Force 45th Space Wing Weather Squadron, said there is an 80 percent chance conditions will be acceptable for flight on Thursday. A front will start crossing over the Florida peninsula the following day, raising the chances that low clouds could prevent a launch. There is a 70 percent chance of acceptable weather on Friday and a 60 percent chance on Saturday. Web posted. (2011). [NASA Picks Up Shuttle Countdown [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, February 21].]

**Can tax credits entice space-related businesses to Florida?**

When the space shuttle is retired later this year, Kennedy Space Center will turn into a virtual ghost town, without a government rocket to launch for the first time in 50 years. The only launch activity will be at nearby Cape Canaveral Air Force Station, where United Launch Alliance sends up satellites and SpaceX is set to continue testing the Flacon 9 rocket it plans to send to the International Space Station. State Rep. Steve Crisafulli, R-Merritt Island, is trying to spur launch activity with HB 873, which would provide tax incentives to new space-related ventures in hopes of providing jobs to the 7,000 or so shuttle workers looking at imminent layoffs. The bill creates a fully transferable net operating loss tax credit, which would allow space-related businesses to sell their net operating losses to other Florida companies for cash. The bill also credits a non-transferable corporate income tax credit of up to 50 percent for a commercial space-related business. To qualify for either incentive, a space business must create or maintain at least 35 jobs and invest a minimum of $15 million in infrastructure development within three years of the bill's effective date. "Florida is no longer the national leader in space-related incentives. Other states are passing us by, so the Legislature must take action to attract more space businesses," Crisafulli said in a statement. "97% of the space-related market opportunity is located outside of Florida – it is ours to capture, and this bill will help us do just that." Web posted. (2011). [Can tax credits entice space-related businesses to Florida? [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, February 21].]

**X-37B spacecraft joins up with Atlas launcher**

The second Orbital Test Vehicle, the U.S. military's secretive mini space shuttle, arrived at the Atlas 5 rocket's assembly hangar Monday morning for mounting atop the launcher. Liftoff is scheduled for March 4 from Cape Canaveral's Complex 41. Already shrouded within in the aerodynamic nose cone for launch, the OTV 2 spaceplane was hauled across the Cape overnight from its processing area to the Atlas'

Vertical Integration Facility. A heavy-duty crane hoisted the payload into the towering VIF around 8:30 a.m. and cautiously positioned above the two-stage launcher for mating later in the day. The next couple of weeks will see a full array of combined systems testing and final readiness reviews conducted before giving a "go" to fly. The United Launch Alliance rocket will be rolled to the nearby launch pad aboard a mobile platform the day before liftoff. Comprised of the kerosene-fueled first stage, the single-engine cryogenic Centaur upper stage, the large Swiss-made nose cone and no strap-on solid motors, this Atlas is known as the 501 configuration. The Atlas was wheeled to the pad for a countdown dress rehearsal earlier this month, rolling out February 3, undergoing a simulated launch day and fueling exercise on February 4 and then returning to the VIF on February 5. The mission follows the successful first OTV test flight last year that began with an April 22 launch from Florida, more than seven months spent in orbit and then concluded with a pinpoint landing at Vandenberg Air Force Base in California on December 3. Air Force officials hailed the first OTV mission as a complete success in demonstrating the unmanned craft's ability to operate in orbit, carrying out in-space operations and then autonomously returning to Earth for a runway landing. The upcoming flight of the second spaceplane will continue developing the X-37B program's capabilities. However, exactly what is being carried within the craft's payload bay is classified. This will be the Atlas rocket's first of five planned launches this year. Further missions include a National Reconnaissance Office payload on April 12, a new-generation missile warning satellite in early May, NASA's Juno probe bound for Jupiter in August and the Mars Science Laboratory rover in November. Web posted. (2011). [X-37B spacecraft joins up with Atlas launcher [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, February 21].]

**February 22: List of NASA CCDev Callbacks Grows to Eight**

As it awaits congressional action on its 2011 budget, NASA is proceeding with plans to award roughly $200 million to companies developing technologies in support of the agency's commercial space transportation goals. NASA contacted eight companies in February, inviting Alliant Techsystems (ATK), Blue Origin, Boeing, Excalibur Almaz, Orbital Sciences Corp., Sierra Nevada Corp., Space Exploration Technologies (SpaceX) and United Launch Alliance (ULA) to Johnson Space Center in Houston to discuss their proposals for a second round of awards under the agency's Commercial Crew Development (CCDev) program, according to industry sources. NASA hopes to make the awards in March. NASA spokesman Michael Braukus said in a Feb. 22 e-mail that procurement regulations prevent NASA from commenting on questions about CCDev. Multiple industry sources had said NASA contacted six companies in writing the week of Feb. 14, inviting them to discuss their bids in Houston and laying out the strengths and weaknesses of specific proposals. NASA started the CCDev program in 2009 with $50 million in economic stimulus funds. The agency awarded the first round of contracts last February to a mix of five new and established aerospace firms, including Blue Origin, Boeing, Sierra Nevada and ULA. NASA officials have said the value of the second round of CCDev contracts, known as CCDev 2, will depend on funds appropriated this year. The NASA Authorization Act of 2010 recommended Congress appropriate $312 million for NASA's commercial crew initiatives this year. However, the U.S. House of Representatives approved a continuing resolution Feb. 19 that would slash funding for NASA in the remaining seven months of this fiscal year by about $600 million below the $18.7 billion appropriated for the agency in 2010. Web posted. (2011). [List of NASA CCDev Callbacks Grows to Eight [Online]. Available WWW: http://www.spacenews.com/ [2011, February 22].]

**Former space shuttle workers find new home at Embraer**

Having a reservoir of skilled aerospace workers is already paying off for Brevard County. At a ribbon cutting Monday for Brazilian jet manufacturer Embraer S.A.'s first U.S final assembly aircraft plant at Melbourne International Airport, executives said the company has hired 61 people for its operation. Eighteen of those new employees -- 30 percent of the total so far -- previously worked on the NASA's shuttle program. Soon they will be working on assembling and outfitting Embraer's Phenom 100 and 300 executive jets. More former shuttle workers are expected to be hired as Embraer heads toward its 200-person employment level in Melbourne. Finding other skilled jobs for displaced space shuttle workers

has become a priority for local economic development officials. They predict at least 8,000 workers will lose their jobs when the space shuttle program ends later this year. Shuttle workers are attractive hires because of their work ethic, their rigid adherence to safety and their ability to follow process and procedure. Two other aviation companies soon to break ground at Melbourne International, AAR Corp. and MidairUSA, also noted that the skilled work force was a big advantage for the Space Coast over other communities they were considering. Web posted. (2011). [Former space shuttle workers find new home at Embraer [Online]. Available WWW: http://www.floridatoday.com/ [2011, February 22].]

**Space Shuttle Discovery counts down toward launch**

NASA is counting down to the planned launch Thursday of shuttle Discovery and six astronauts on the orbiter's final flight into space. Grounded for four months by dangerous external tank defects, Discovery and its crew are slated to blast off from Kennedy Space Center at 4:50 p.m. Thursday. The orbiter's 39th flight will cap a career that has included missions to the International Space Station, the Hubble Space Telescope, Russia's space station Mir and the first flights after the 1986 Challenger disaster and the 2003 Columbia accident. John Glenn flew aboard Discovery on his 1998 return to space at age 77. Now poised for launch at pad 39A, Discovery has been upright on its mobile launcher platform a near-record 168 days. Only Columbia's 183-day stand on its platform before a 1990 astronomy mission was longer. Columbia's STS-35 mission was grounded by external tank hydrogen leaks. Discovery's extended stay on its launch platform is the result of cracks engineers detected in support braces in the ribbed midsection of the tank. NASA's oceanside shuttle launch pad will be cleared of all but essential personnel early today so engineers in Firing Room 4 can load liquid hydrogen and liquid oxygen into storage tanks aboard the orbiter. The chemical reactants are combined in shuttle fuel cells to generate the electricity needed to power spaceship systems. That hazardous operation will begin around 12:30 p.m. and the pad will be reopened for other work at 6 p.m. An on-time launch Thursday would lead toward a 12:44 p.m. March 7 landing at KSC's three-mile shuttle runway. In that case, Discovery will have tallied 362 days, 23 hours, 54 minutes and 29 seconds in flight. Web posted. (2011). [Space Shuttle Discovery counts down toward launch [Online]. Available WWW: http://www.floridatoday.com/ [2011, February 22].]

**NASA Seeks Nonprofit ISS Manager**

Officials from the National Aeronautics and Space Administration (NASA) outlined the key features of a solicitation for proposals for an independent, nonprofit research management organization to foster and manage the use of the International Space Station (ISS) as a National Laboratory yesterday. Mark Uhran, ISS assistant associate administrator, explained that since 2005 when the ISS was designated by law as a national laboratory, 50 percent of the U.S. portion of the ISS has been made available for research by non-NASA entities, such as universities, private firms, and other government agencies. Based on another law, the 2010 NASA authorization act, the agency is now seeking to create an organization to manage this non-NASA research. He clarified that NASA will maintain control of the other 50 percent necessary for pursuing its own goals, which are focused on basic scientific research, biomedical human research, and technology development. Uhran said the organization should be in place by the end of this fiscal year, with activities ramping up as commercial transportation systems to the ISS come on line in the next 12-18 months. With a $15 million budget for the national laboratory, the relatively small organization - 15-25 people - will be tasked with communicating with potential user communities, managing agreements, as well as overseeing the execution of approved projects. Uhran explained that progress on using the ISS as a national lab is very important because it will fulfill the vision of a station "built not solely for NASA usage." He said the goal is to "maximize [ISS's] value to the American public" for their investment and that its long-term productivity will be measured both by NASA and non-NASA usage. Creation of the non-profit organization will "be an important step in ensuring that that productivity is realized," he added. The deadline for proposals is April 1, 2011 and selection will be made by the end of May. Web posted. (2011). [NASA Seeks Nonprofit ISS Manager [Online]. Available WWW: http://www.spacepolicyonline.com/ [2011, February 23].]

**February 23:** **California rocket launch scrubbed this morning**

A Taurus XL rocket and its climate-probing satellite payload were just minutes away from blastoff today from a minimalist launch pad at Vandenberg Air Force Base, California. But a technical problem halted the countdown and scrubbed the liftoff for 24 hours. Another try is targeted for tomorrow at 2:09 a.m. local (5:09 a.m. EST). Web posted. (2011). [California rocket launch scrubbed this morning [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, February 23].]

**NASA Managers: It's a "Go" for Launch**

At today's pre-launch news conference NASA's mission management team have given their unanimous approval for space shuttle Discovery's launch tomorrow at 4:50 p.m. EST. "Everything is on track and going beautifully with the countdown," said Mike Moses, mission management team chair. "We're really looking forward to a very action-packed, successful mission and everything is on track." Mike Leinbach, shuttle launch director, agreed that everything is going extremely well with the launch countdown. He also acknowledged the processing teams who worked on Discovery, its flight systems and ground elements. "As we're powering up (the systems) we're seeing no problems at all." Kathy Winters, shuttle weather officer, reported that the weather remains exceptional with only a 20 percent chance that weather will be prohibitive at launch time. The only slight issue may be a localized off-shore shower in the late afternoon. The forecast during tanking also is looking very good. At 7:15 a.m. EST NASA TV will begin coverage of the fueling of the external tank. Launch coverage for Discovery's final mission to the International Space Station will begin at 11:30 a.m. Web posted. (2011). [NASA Managers: It's a "Go" for Launch [Online]. Available WWW: http://www.spaceref.com/ [2011, February 23].]

**Discovery Unveiled On Eve of Last Launch**

NASA unveiled shuttle Discovery at Kennedy Space Center tonight on the eve of its planned launch to the International Space Station -- it's 39th and final flight. The Rotating Service Structure at Launch Complex 39A began backing away from the 18-story spaceship shortly after 8 p.m., leaving the launch vehicle poised for a planned 4:50 p.m. liftoff on STS-133, a mission primarily aimed at delivery a spacious storage module to the outpost. The gantry move cleared the way for NASA engineers to begin loading more than a half-million gallons of supercold liquid hydrogen and liquid oxygen into the shuttle's 15-story external tank. Cracks in support braces in the ribbed mid-section of the tank created one of the most difficult technical challenges NASA has faced in the 30-year history of the shuttle program and the test, analyses and ultimate repairs on the tank prompted a four-month delay in the launch. Senior mission managers will meet at 7 a.m. to decide whether to fuel the external tank and make a launch attempt on Thursday. A three-hour external tan propellant-loading operation is scheduled to begin at 7:25 a.m. Web posted. (2011). [Discovery Unveiled On Eve of Last Launch [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, February 23].]

**STS-133 Countdown Timeline**

The launch window is roughly 10 minutes long. To maximize ascent performance, NASA targets the middle of the window. A final hold in the countdown at the T-minus nine-minute mark will be extended as required to hit the desired launch time.

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Wed  02/23/11

40...45...00...12:00 AM......SSME throat plug removal
37...45...00...03:00 AM......Countdown resumes

37...45...00...03:00 AM......Main engine preps
37...45...00...03:00 AM......MECs 1 and 2 on; avionics system checkout
34...45...00...06:00 AM......FRCS Tyvek cover remova/inspect
31...15...00...09:30 AM......Deflate RSS dock seals; tile inspection
30...45...00...10:00 AM......Tile inspection
30...45...00...10:00 AM......TSM prepped for fueling
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29...55...26...10:49 AM.....Crew orbiter/payload briefings

29...45...00...11:00 AM.....Begin 13-hour 25-minute hold
28...15...00...12:30 PM.....RSS rotation preps
28...15...00...12:30 PM.....OIS communications check with JSC
27...25...00...01:20 PM.....JSC flight control team on station
26...15...00...02:30 PM.....Comm activation
25...45...00...03:00 PM.....Crew module voice checks
24...45...00...04:00 PM.....L-1 engineering briefing
24...27...00...04:18 PM.....Crew weather briefing
23...45...00...05:00 PM.....Flight crew equipment late stow
20...45...00...08:00 PM.....RSS to park position
19...45...00...09:00 PM.....Final TPS, debris inspection
19...15...00...09:30 PM.....Ascent switch list

Thu 02/24/11

16...20...00...12:25 AM.....Resume countdown

16...00...00...12:45 AM.....Pad clear of non-essential personnel
16...00...00...12:45 AM.....APU bite test
15...10...00...01:35 AM.....Fuel cell activation
14...20...00...02:25 AM.....Booster joint heater activation
13...50...00...02:55 AM.....MEC pre-flight bite test
13...35...00...03:10 AM.....Tanking weather update
12...50...00...03:55 AM.....Final fueling preps; launch area clear
12...20...00...04:25 AM.....Red crew assembled
11...35...00...05:10 AM.....Fuel cell integrity checks complete

11...20...00...05:25 AM.....Begin 2-hour built-in hold (T-minus 6 hours)
11...10...00...05:35 AM.....Safe-and-arm PIC test
10...32...00...06:13 AM.....Crew wakeup
10...20...00...06:25 AM.....External tank ready for loading
10...02...00...06:43 AM.....Mission management team tanking meeting
09...20...00...07:15 AM.....NASA TV fueling coverage begins
09...20...00...07:25 AM.....Resume countdown (T-minus 6 hours)

09...20...00...07:25 AM.....LO2, LH2 transfer line chilldown
09...10...00...07:35 AM.....Main propulsion system chill down
09...10...00...07:35 AM.....LH2 slow fill
08...40...00...08:05 AM.....LO2 slow fill
08...35...00...08:10 AM.....Hydrogen ECO sensors go wet
08...30...00...08:15 AM.....LO2 fast fill
08...20...00...08:25 AM.....LH2 fast fill
06...25...00...10:20 AM.....LH2 topping
06...20...00...10:25 AM.....LH2 replenish
06...20...00...10:25 AM.....LO2 replenish

06...20...00...10:25 AM.....Begin 2-hour 30-minute built-in hold (T-minus 3 hours)
06...20...00...10:25 AM.....Closeout crew to white room
06...20...00...10:25 AM.....External tank in stable replenish mode
06...17...00...10:28 AM.....Ascent flight control team on console
06...05...00...10:40 AM.....Astronaut support personnel comm checks
05...35...00...11:10 AM.....Pre-ingress switch reconfig
05...15...00...11:30 AM.....NASA TV launch coverage begins
04...25...00...12:20 PM.....Final crew weather briefing

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04...15...00...12:30 PM......Crew suit up begins
03...50...00...12:55 PM......Resume countdown (T-minus 3 hours)

03...45...00...01:00 PM......Crew departs O&C building
03...15...00...01:30 PM......Crew ingress
02...25...00...02:20 PM......Astronaut comm checks
02...00...00...02:45 PM......Hatch closure
01...30...00...03:15 PM......White room closeout

01...10...00...03:35 PM......Begin 10-minute built-in hold (T-minus 20m)
01...00...00...03:45 PM......NASA test director countdown briefing
01...00...00...03:45 PM......Resume countdown (T-minus 20m)

00...59...00...03:46 PM......Backup flight computer to OPS 1
00...55...00...03:50 PM......KSC area clear to launch

00...49...00...03:56 PM......Begin final built-in hold (T-minus 9m)
00...24...00...04:21 PM......NTD launch status verification
00...09...00...04:41:27 PM...Resume countdown (T-minus 9m)

00...07...30...04:42:57 PM...Orbiter access arm retraction
00...05...00...04:45:27 PM...Launch window opens
00...05...00...04:45:27 PM...Hydraulic power system (APU) start
00...04...55...04:45:32 PM...Terminate LO2 replenish
00...04...00...04:46:27 PM...Purge sequence 4 hydraulic test
00...04...00...04:46:27 PM...IMUs to inertial
00...03...55...04:46:32 PM...Aerosurface profile
00...03...30...04:46:57 PM...Main engine steering test
00...02...55...04:47:32 PM...LO2 tank pressurization
00...02...35...04:47:52 PM...Fuel cells to internal reactants
00...02...30...04:47:57 PM...Clear caution-and-warning memory
00...02...00...04:48:27 PM...Crew closes visors
00...01...57...04:48:30 PM...LH2 tank pressurization
00...00...50...04:49:37 PM...SRB joint heater deactivation
00...00...31...04:49:56 PM...Shuttle GPCs take control of countdown
00...00...21...04:50:06 PM...SRB steering test
00...00...07...04:50:20 PM...Main engine start (T-6.6 seconds)
00...00...00...04:50:27 PM...SRB ignition (LAUNCH)
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Web posted. (2011). [STS-133 Countdown Timeline [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, February 23].]

**Educational Balloon Will Attempt Photos of Discovery Launch**

"If all goes according to plan, a balloon with a student-oriented payload will photograph Space Shuttle Discovery as it climbs into space from an altitude of 100,000 feet. There will also be live streaming video from the balloon itself during the mission - sent back by two regular smartphones running Google's Android operating system. Co-sponsored by the Challenger Center for Space Science Education, this mission is one in a series of flights conducted by Quest for Stars, a California-based non-profit educational organization that uses off-the-shelf hardware and a little ingenuity to allow students to place experiments at the edge of space at exceptionally low cost. Quest for Stars and the Challenger Center for Space Science Education have now joined together to promote the use of these low cost delivery systems. This mission will be the first of what is hoped to be many future collaborations." Web posted. (2011). [Educational Balloon Will Attempt Photos of Discovery Launch From 100,000 ft [Online]. Available WWW: http://www.nasawatch.com/ [2011, February 23].]

**Engineers' society 50 years old**

As the shuttle program ends this year, throwing thousands of engineers out of work, the Canaveral Council of Technical Societies is seeing a resurgence in interest as it marks its 50th anniversary. Organizers and longtime members hope the organization, which saw its membership peak as the Apollo program shifted into the shuttle program 30 years ago, can become a focal point for networking as the new era of the commercial space industry unfolds. "One of the aims of the organization is to be a way of bringing different groups together," CCTS vice chairman David Fleming, a professor of mechanical and aerospace engineering at Florida Tech, said. The renewed interest already seems to be taking hold, at least if interest in the group's annual banquet is any indicator. Some 117 people have signed up to attend the Thursday event, nearly twice as many as last year. Several new corporate sponsors also have signed up, indicating their interest in using the organization as a networking springboard. Founded in 1960, CCTS included 28 local technical societies at its peak 20 years later. Some 19 groups remain in the fold. Until 2004, CCTS sponsored the Space Congress, an annual week-long gathering of space experts who traveled to Cocoa Beach to share information and learn about the latest developments in the field of aerospace engineering. But since the last Space Congress, CCTS has seen its membership become smaller, older and less enthusiastic. The purpose of CCTS is to promote and support the technical, scientific, engineering and professional organizations of the Space Coast . Founder Jack Wiles, who died in 2008, envisioned a social and technical interchange that would allow engineers from different disciplines to share information. "We didn't have near as many places that you could go and meet people," said mechanical engineer James W. Johnson, 80, who worked five years for The Boeing Co. and 30 years for NASA. "He wanted to get people to come to meetings." CCTS hopes to be a framework to organize new business in the post-shuttle era. Web posted. (2011). [Engineers' society 50 years old [Online]. Available WWW: http://www.floridatoday.com/ [2011, February 23].]

**NASA Schedules Next Glory Mission Launch Attempt**

The launch of NASA's Glory spacecraft from Vandenberg Air Force Base in California is currently planned for no earlier than Friday, Feb. 25 at 5:09 a.m. EST. Engineers from NASA and Orbital Sciences Corp. continue to troubleshoot a technical issue that arose during Wednesday's initial launch attempt. The target launch date also will ensure personnel get the required rest before entering another countdown. The Glory satellite is being launched aboard an Orbital Sciences Taurus XL rocket on a mission to improve our understanding of how the sun and tiny atmospheric particles called aerosols affect Earth's climate. Web posted. (2011). [NASA Schedules Next Glory Mission Launch Attempt [Online]. Available WWW: http://www.spaceref.com/ [2011, February 23].]

**Hoped-for space shuttle Atlantis flight now planned**

NASA's hope to fly three more space shuttle flights, including Thursday's launch of Discovery, now appear close enough to be met that managers are counting on it. Mike Moses, space shuttle launch integration manager for NASA, said Wednesday at a Kennedy Space Center press briefing that agency budget crunchers are confident they have found the money to launch and fly Atlantis on one extra flight this year. Until now, NASA had been counting for sure on only two more space shuttle launches: Discovery, plus that of Endeavour as early as April 19. The proposed final mission for Atlantis, known as as STS-135, was sought, but not officially funded. While it still might not be firmly funded, and while NASA's funding still can change, Moses said NASA now is counting on it. It could launch as early as June 28. "We have a plan in place to shuffle the money around and fund the flight, STS-135," Moses said. "I'll say it generically how I portray it to the troops ... effectively we've gotten the letter from headquarters saying we'll be able to fly STS-135 regardless of what happens in the next budget." He cautioned that scenarios could change, but suggested the current expectation is the flight will happen. "For all intents and purposes we've switched to: that's a manifested mission plan, and we are launching this vehicle on 135," he said. Web posted. (2011). [Hoped-for space shuttle Atlantis flight now planned [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, February 23].]

**NASA chief looks to commercial crafts for space station**

The space shuttle program should have come to an end a long time ago, NASA administrator Charles Bolden told CNN in an exclusive interview Wednesday. The 30-year program has been kept on life support because the United States has not readied another vehicle to take its place. "What is not acceptable is the fact that the most powerful nation in the world, the United States of America, finds itself in a situation that we didn't do the proper planning to have a vehicle in place to replace shuttle when it lands its last landing," Bolden said. NASA originally planned to retire the aging shuttle fleet last September, but mission delays have pushed that date. But once Endeavour, Atlantis and Discovery are permanently grounded, Russia's aging Soyuz capsules will ferry astronauts and cosmonauts to the space station and bring what supplies can fit in the smaller craft. And that will have to do, perhaps throughout this decade, until commercial cargo spacecraft are available. The last shuttle landing, according to the administrator, will not be in April when Endeavour is scheduled to fly. NASA says it wants one more mission to resupply the space station. That flight would be STS-135 this summer, using the Atlantis orbiter and designated with the acronym that stands for "Space Transportation System." But whether NASA will have the money for the flight -- about a half a billion dollars -- is in question. "We are budgeted for 135 and unless something disastrous happens, it's our intent to fly it," said Bolden, "It's in the authorization bill signed by the president back in November, so for me it's the law and I'm excited about it because I need it, so we plan to fly 135." That would leave three flights before the program ends. STS-133 using Discovery sits on the launch pad ready to make its last trip into space Thursday. In April, STS-134 with Endeavour is schedule to fly. Commanding that mission is astronaut Mark Kelly. With those launches, the nation is seeing an end to its only means of putting humans in space. It is also seeing an end to a program that caught the public's attention nearly 30 years ago, with the launch on April 12, 1981, of the shuttle Columbia on the program's first mission. Bolden hopes that at least two commercial space companies will emerge to transport astronauts to the International Space Station. This will allow NASA to concentrate on building a new heavy-lift rocket capable of leaving lower Earth orbit. There had been concern whether the space agency would have enough money to develop this vehicle. Bolden said the money is there to build a vehicle that will evolve over time. "When I say we are not going to do things the way we used to, we're not building the world's heaviest, biggest rocket right out of the chute. It's going to take us ... a decade or so to get to the point that we have the final vehicle that is going to take the first humans to Mars," said Bolden. The White House has said it wants humans on Mars by the mid-2030s. Right now, Bolden says his priority is flying these last three shuttle missions and bringing the astronauts home safely. Web posted. (2011). [CNN Exclusive: NASA chief looks to commercial crafts for space station [Online]. Available WWW: http://www.cnn.com/ [2011, February 23].]

**Nice weather, big crowds expected for Discovery's last launch**

NASA tonight plans to unveil Discovery for its final flight, a planned 4:50 p.m. Thursday blastoff expected to draw fair weather and big crowds to the Space Coast. "People are starting to realize that they either see one now or they don't get to see one at all," said Steve Payne, a NASA test director. "There's been a lot of interest, a lot of people trying to come out. It ought to be a good show." On Tuesday, the countdown to the first of the last three shuttle flights continued smoothly at Kennedy Space Center. NASA reported a slight leak from a helium regulator in Discovery's orbital thruster system, but said the problem was minor. "We've seen this condition before, it is well within acceptable limits and we're going to accept it for flight," Payne said. Propellants were loaded into the fuel cells that power the orbiter's electrical systems during flight. Mission commander Steve Lindsey and pilot Eric Boe practiced landings in a Gulfstream II jet modified to handle like an orbiter on descent. The forecast remained 80-percent "go" for Thursday afternoon's 10-minute launch window. "The weather is good and is going to remain good all the way through all of our pre-launch processing and into launch day," said Kathy Winters, the shuttle weather officer. Today, the last pieces of crew equipment and time-sensitive experiments will be stowed on Discovery's mid-deck. At 8 p.m., teams are scheduled to swing open the 13-story rotating gantry at launch pad 39A to expose Discovery for fueling and flight Thursday. The shuttle and its crew of six are set to fly an 11-day mission to the International Space Station to deliver a storage module, a spare radiator and a human-like robot. "The really big stuff we need to take up while we can," Payne said.

After a nearly four-month mission delay to repair Discovery's external tank, Payne said the tank was "stronger than it was when it was new" and launch teams were ready. "We're all looking forward to a successful launch on Thursday," he said. Web posted. (2011). [Nice weather, big crowds expected for Discovery's last launch [Online]. Available WWW: http://www.floridatoday.com/ [2011, February 23].]

**2 hurt after contact with power line at Astronaut Hall of Fame**

Two workers were seriously injured on the grounds of the United States Astronaut Hall of Fame after coming in contact with a power line while putting up a hospitality tent in preparation for Thursday's launch of the space shuttle. The incident happened about 11:30 a.m. at 6200 Vectorspace Blvd., which sits off of the Indian River Lagoon. Bystanders — including a group of about 50 students on a field trip — saw a bright flash and witnessed the two men knocked to the ground. Four workers had been erecting a metal-frame tent and readying it for a nearby stage when the shock occurred. One of the men was severely burned but both were breathing, said Scott Gaenicke, spokesman for the Titusville Police Department. "Two of the four workers felt a tingle and quickly let go. The tent apparently came in contact with the power line. They were getting ready for the launch tomorrow," Gaenicke said of the incident. "There were a lot of people around." Florida Power & Light crews shut off electricity to the stage area. Web posted. (2011). [2 hurt after contact with power line at Astronaut Hall of Fame [Online]. Available WWW: http://www.floridatoday.com/ [2011, February 23].]

**February 24: Space shuttle Discovery facts and timeline**

Name: Drawn from several historic ships including Henry Hudson's exploring Hudson Bay in the 1600s and James Cook's exploring South Pacific in the 1770s, discovering Hawaiian Islands. Figures: Third shuttle commissioned, following Columbia and Challenger. Mission STS-133 will be its 39th and last, most of any shuttle. Will have carried 252 crew members, most. Orbited Earth 5,628 times, going 143 million miles. Highest shuttle orbit, 360 miles. Highlights: Launched Hubble Space Telescope. Fixed Hubble Space Telescope. Carried two U.S. Senators into space, Jake Garn and John Glenn. Flew both "return to flight" missions, following Challenger and Columbia disasters. Notable astronauts: Charlie Bolden (NASA administrator,) Michael Coats (director of Johnson Space Center,) Eileen Collins, Jake Garn, John Glenn, Rick Husband, Mark Kelly, Sergie Krikalev, Tom Mattingly, Story Musgrave, Lisa Nowak, Judith Resnick. Timeline: Aug. 30, 1984: Maiden flight, launched three satellites; April 12, 1985: Carried U.S. Sen. Jake Garn (R-Utah) into space; Sept. 29, 1988: Return to flight mission after 1986 Challenger disaster; April 24, 1990: Delivered Hubble Space Telescope to orbit; Oct. 10, 1990: Delivered Ulysses spacecraft to explore Sun; Feb. 3, 1994: Carried first Russian cosmonaut, Sergei Krikalev, on U.S. shuttle; Feb. 3, 1995: First female shuttle pilot, Eileen Collins; Feb. 11, 1997: Fixed Hubble Space Telescope; Oct. 29, 1998: Carried U.S. Sen. John Glenn (D-Ohio) in his return to space; May 27, 1999: First shuttle docking to the International Space Station; July 26, 2005: Return to flight mission after 2003 Columbia disaster; April 5, 2010: Most recent mission. Web posted. (2011). [Space shuttle Discovery facts and timeline [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, February 24].]

**NASA Performs Last-Minute Repairs on Shuttle Discovery**

NASA technicians performed a quick repair on space shuttle Discovery just in time to get back on track for a launch attempt today at 4:50 p.m. EST (2150 GMT). Following a successful fix to a chipped tile around the space shuttle Discovery's crew hatch, the space shuttle is ready to launch toward the International Space Station from Launch Pad 39A here at NASA's Kennedy Space Center. The mission will be shuttle Discovery's final spaceflight before being retired. "We're recommended to go ahead and continue at this time," said NASA test director Steve Payne following the repairs. "We're in a go configuration for flight." The issue arose when some of the black thermal covering on one of the tiles around the hatch of the shuttle's crew compartment was chipped when technicians at the launch pad removed some protective paper. All conditions are "go" for launch, NASA officials said, with weather predictions looking promising for this afternoon's liftoff. Commander Steve Lindsey will lead the crew of

six, including pilot Eric Boe and mission specialists Michael Barratt, Alvin Drew, Steve Bowen and Nicole Stott, on the 11-day STS-133 mission. Web posted. (2011). [NASA Performs Last-Minute Repairs on Shuttle Discovery [Online]. Available WWW: http://www.space.com/ [2011, February 24].]

**Shuttle Discovery takes off on its final flight**

The Space Shuttle Discovery launched late Thursday afternoon from Kennedy Space Center in Florida, marking the start of its 39th and final flight. "This was a pretty successful day," said Bill Gerstenmaier, NASA's associate administrator for space operations. "It was just an amazing event." The six-member crew will deliver a storage module, a science rig and spare parts to the international space station during its 11-day mission. Originally scheduled for November, Discovery's launch had been delayed in order to make repairs to the external tank's support beams. And NASA halted its countdown on Thursday, at five minutes, because of a computer problem related to safety on the "eastern range." But after a confirmation that all was good to go, the countdown resumed, and the shuttle lifted off about three minutes behind its planned 4:50 p.m. ET launch. Five minutes in, NASA's official blog reported "a good separation for solid rocket boosters," which separated from the main shuttle after pushing the shuttle through Earth's lower atmosphere. Shortly thereafter, the blog reported that the Discovery and its astronauts were "safely in orbit," having "performed flawlessly" on its launch. Gerstenmaier noted, and video showed, four pieces of foam tearing apart from the shuttle about four minutes into launch. But the NASA administrator called these incidents "typical" and likely harmless, since they came off "after the area of concern" when the atmosphere was so thin to make its impact negligible. The crew is headed by Steve Lindsey, and includes a late addition in Steve Bowen -- who became the first ever astronaut to fly consecutive missions after he was assigned to take the place of Tim Kopra, when Kopra was injured last month in a bicycle accident, according to NASA. Prior to Thursday's launch, Discovery had spent 352 days in orbit, circling the Earth 5,628 times. It has also carried 246 crew members, more than any space vehicle in history. Web posted. (2011). [Shuttle Discovery takes off on its final flight [Online]. Available WWW: http://www.cnn.com/ [2011, February 24].]

**NASA suspends launch of Glory after problem with ground equipment**

NASA says the launch of an Earth-observing satellite from California has been postponed because of a problem with ground equipment. A Taurus XL rocket carrying the Glory satellite was scheduled to lift off early Wednesday from Vandenberg Air Force Base. But the launch was called off when a control console in a launch support van gave a false indication about the rocket's status. NASA says the console indicated a command had been sent when there had been no such command. Engineers have not resolved the error, and further launch attempts this week have been called off. NASA is weighing launch possibilities in March. The $434 million mission will study how airborne particles known as aerosols affect climate. The mission is managed by Goddard Space Flight Center in Maryland. Web posted. (2011). [NASA suspends launch of Glory satellite after problem with ground equipment; may try in March [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, February 24].]

**NASA Targets June Merger of Operations, Exploration Divisions**

NASA expects by June 5 to combine its Exploration Systems and Space Operations mission directorates into a single organization, dubbed the Human Exploration and Operations Mission Directorate, according to internal briefing charts obtained by Space News. The new organization is expected to better-align NASA's manned spaceflight goals as the U.S. space agency retires its fleet of shuttle orbiters and outsources crew and cargo transportation to and from the international space station to private firms. Bill Gerstenmaier, associate administrator for NASA's Space Operations Mission Directorate (SOMD), would oversee the merged organization, which would manage the international space station and space shuttle programs, commercial crew and cargo activities and the agency's new Space Launch System and Multi-Purpose Crew Vehicle initiatives, among others, according to charts presented to agency officials during a Feb. 22 meeting. Doug Cooke, currently associate administrator for NASA's Exploration Systems Mission Directorate (ESMD), would serve as Gerstenmaier's deputy, the charts show. SOMD Deputy

Administrator Lynn Cline would become deputy associate administrator for policy and plans under Gerstenmaier, while Cooke's deputy, Laurie Leshin, would become deputy associate administrator for program strategy, according to the document. John Olson, who directed the Human Exploration Framework Team that examined options for a new human spaceflight architecture, would serve as head of strategic analysis in the new organization, reporting to Gerstenmaier's office. Cline would head mission services as acting director until a permanent lead is appointed, and Toni Mumford, who currently serves as chief of SOMD's Resources, Management and Analysis, would continue in that role under the merger. Divisions within the new directorate would include: the International Space Station, led by Mark Uhran, who currently serves as assistant associate administrator for the program; Commercial Human Spaceflight, to be run on an acting basis by Phil McAlister, commercial crew planning lead at NASA headquarters here, until a permanent division chief is named; Human Spaceflight Research & Capabilities, to be led by Benjamin Neumann, director of the Advanced Capabilities Division currently housed in ESMD; Advanced Exploration Systems, to be led by Leshin until a new director is installed; Space Launch System and Multi-purpose Crew Vehicle, led by Dan Dumbacher, chief of the engineering directorate at NASA's Marshall Space Flight Center in Huntsville, Ala.; Space Communications and Navigation, which would continue to be led by Badri Younes; Space Shuttle, to be led by William Hill, currently assistant associate administrator for the program; and Launch Services, currently run by Jim Norman. According to the briefing charts, NASA expects to hold an all-hands meeting in late March to gather input from SOMD and ESMD employees. Formal notification of the merger plan would be presented to the White House Office of Management and Budget and the U.S. Congress for approval April 20-22, with an estimated merger date of June 5, the charts show. Gerstenmaier and Cooke raised the possibility of the merger in a Dec. 20 memo to agency employees in which they said NASA Administrator Charles Bolden asked them to produce a plan by early 2011 for combining the two organizations. Web posted. (2011). [NASA Targets June Merger of Operations, Exploration Divisions [Online]. Available WWW: http://www.spacenews.com/ [2011, February 24].]

**February 25: Discovery crew to inspect heat shields today**

Discovery's six-person crew is up for its first full day in space on the shuttle's final flight after Thursday's 4:53 p.m. blastoff from Kennedy Space Center. The mission's first wake-up song beamed up from Mission Control in Houston came at 6:53 a.m. EST. The family of mission specialist Mike Barratt, a father of five who is enjoying his 200th day in space, selected the tune: "Through Heaven's Eyes" from "The Prince of Egypt." Today's work in space will focus on inspections of Discovery's heat shields using a 50-foot boom equipped with cameras and sensors attached to the shuttle's robotic arm. The standard post-Columbia procedure is scheduled to begin around 11 a.m. NASA on Thursday reported at least four potential strikes by pieces of insulating foam that broke away from the shuttle's external tank during launch. But managers said all four events happened late enough during flight, when foam hits with little relative velocity, that they posed little risk of damage. Images taken today will be analyzed by teams on the ground for a couple of days, and a closer inspection could be ordered later in the mission if any damage is found. Web posted. (2011). [Discovery crew to inspect heat shields today [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, February 25].]

**'Cryopumping' likely cause of Discovery tank foam loss**

NASA's Mission Management Team met briefly Friday to assess the initial progress of the shuttle Discovery's mission and review preliminary data about at least four debris "events" seen during the climb to space. It is not yet clear how many bits of debris might have hit the shuttle's heat shield, but all of the events occurred well beyond the timeframe where impacts can cause major damage. It will take several more days to complete the initial post-launch assessment, including analysis of detailed heat shield photographs that will be taken by the International Space Station's crew during Discovery's approach to the lab complex Saturday. But for now, based on a preliminary assessment, NASA managers are not concerned. The shuttle's external tank features two separate propellant tanks separated by a ribbed "intertank" section where the forward end of the ship's two solid-fuel boosters are attached. The lower

tank holds liquid hydrogen and the upper tank holds liquid oxygen. The base of the upper liquid oxygen tank is supported by a massive flange at the top of the intertank. A similar flange at the bottom supports the top of the liquid hydrogen tank. Between the two flanges, 108 vertical stringers are used to strengthen the walls of the intertank. Discovery blasted off Thursday after a three-and-a-half-month delay to repair cracks in the upper few inches of stringers near the oxygen tank flange and to install modifications to prevent the formation of additional, potentially dangerous stress-relief fractures. MMT Chairman LeRoy Cain said Discovery's tank appeared to perform well during launch and that the area near the top of the intertank where the forward ends of 105 stringers were repaired or modified and refoamed had no obvious problems. But several pieces of foam debris could be seen breaking away from the lower part of the intertank, where the lower ends of the stringers meet the flange at the top of the hydrogen tank. Based on post-Columbia analysis, engineers believe a phenomenon known as "cryopumping" can cause foam to separate from the upper area of the hydrogen tank. Air trapped in the foam first liquifies when the tank is loaded with liquid hydrogen propellant at minus 423 degrees Fahrenheit. During the climb to space, as the hydrogen level in the tank drops, the hardware warms up, the liquified air turns back into a gas and the pressure can cause overlying foam to pop off. Special care is taken during the manufacturing process to minimize the amount of trapped air that might be present in the foam, but cryopumping is a recognized -- and accepted -- risk. "This is in an area where we know we have susceptibility to what we call cryopumping," Cain said. "That's at the very top of the liquid hydrogen tank. When we get to this three- or four-minute time period in ascent, that part of the tank is getting relatively warm compared to what it had been. And so we get this cryopumping and from a physics standpoint ... we know we can lose foam as a result of this cryopumping phenomenon. So that was, we believe preliminarily, the cause of this foam loss. "This is an area of the tank that we're very attuned to in terms of the potential for this kind of debris loss," he said. "So we don't have any concerns about this event. Obviously, we'll do our normal vehicle inspections ... to make sure the vehicle is OK." NASA hopes to launch the shuttle Endeavour April 19 on its final flight. Endeavour's external tank has been modified like Discovery's to strengthen the stringers near the upper oxygen tank flange. Cain said as of now, he doubts any changes will be ordered for Endeavour's tank based on the results of Discovery's launch. But no final decisions will be made until engineers complete their post-launch assessment. Web posted. (2011). ['Cryopumping' likely cause of Discovery tank foam loss [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, February 25].]

**February 26: How would a government shutdown affect NASA?**

The current continuing resolution that funds the federal government, including NASA, expires in less than a week: midnight on Friday, March 4. Unless Congress can agree to a new funding bill, be it a full FY11 appropriations act, as the House passed last week with HR 1, or another short-term stopgap bill, the federal government will be shut down—just as NASA is wrapping up the STS-133 shuttle mission to the ISS. For the mission itself, a shutdown would have little or no impact. "For the mission that's flying we'd probably consider most of the folks mission critical personnel, and that's pretty much transparent to us," said Bill Gerstenmaier, NASA associate administrator for space operations, in the STS-133 post-launch press conference late Thursday. "I think from a top-level standpoint we'll be able to just press on and continue kind of the way we're heading." How it might affect preparations for the final two shuttle missions is less clear. "We'll kind of see what happens. We haven't really done any detailed contingency planning yet," Gerstermaier said of the agency's overall planning. Web posted. (2011). [How would a government shutdown affect NASA? [Online]. Available WWW: http://www.spacepolitics.com/ [2011, February 26].]

**February 27: Endeavour ready to leave hangar Monday morning**

The shuttle Endeavour will take its first steps toward space Monday when the ship moves a quarter-mile from its processing hangar to the Vehicle Assembly Building to join a burnt orange fuel tank and twin solid rocket boosters. Endeavour is scheduled to back out of Orbiter Processing Facility bay No. 2 around 7 a.m. EST (1200 GMT) Monday on a 76-wheel transporter. The 100-ton space plane has been inside

the hangar since landing on its last mission in February 2010. After being thoroughly inspected and geared up for another mission, the orbiter's payload bay doors were closed in November. Endeavour was precisely weighed and workers measured its center-of-gravity Feb. 14, then technicians mounted the ship atop the transporter Feb. 15. Endeavour's landing gear was retracted in preparation for rollover Feb. 16. The shuttle's tank and boosters were mated Jan. 19. Endeavour is being prepared for its 25th and final spaceflight after 19 years of service. NASA currently plans to pause Endeavour's rollover to give space center employees a last chance to see the black-and-white ship before it goes inside the VAB later Monday morning. Once the orbiter moves inside the cavernous assembly building, technicians will attach a heavy-lifting crane sling to Endeavour and methodically unbolt the shuttle from the diesel-powered transporter. The crane will next hoist the 122-foot-long orbiter above the transporter, and the vehicle will drive out from under Endeavour. Then the shuttle will be rotated vertical, pivoted 45 degrees and lifted from the floor of the building's spacious transfer aisle. Endeavour should be lowered into the VAB's northeastern high bay early Tuesday morning next to the shuttle's bullet-shaped external tank and solid rocket boosters. Workers will firmly fasten Endeavour to three attach points on the foam-covered fuel tank, test the fully integrated shuttle and prepare it for rollout to the launch pad. Endeavour should arrive at launch pad 39A on March 10. The schedule calls for the shuttle launch team to load cryogenic propellants into Endeavour's fuel tank March 22 in a crucial prelaunch test to check the integrity of the tank structure and foam insulation. Endeavour's payload of spare parts and scientific gear will get to the launch pad March 24 and be installed in the shuttle's cargo bay March 28. The STS-134 mission will deliver to the space station the Alpha Magnetic Spectrometer, a highly-sensitive instrument to seek out evidence of enigmatic dark matter and antimatter in the universe. Endeavour will also haul a cargo pallet to the station with spare parts and a U.S. Air Force experiment. The shuttle's crew will strap into Endeavour April 1 for a traditional countdown rehearsal. Endeavour is slated to blast off April 19 at 7:48 p.m. EDT (2348 GMT). Web posted. (2011). [Endeavour ready to leave hangar Monday morning [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, February 27].]

**NASA: No Focused Inspection Required**

The joined crews of Discovery and the International Space Station are moving the shuttle's inspection boom to clear the way for the delivery of the Leonardo stowage module. Meanwhile, engineers say Discovery's heat-shield is in good shape and no focused inspection will be required on the sixth day of its 39th and final flight, officials said today. Engineers poured over data beamed back from a now-standard inspection of heat-shield components on the second day of a shuttle flight along with photographs taken of the underside of the shuttle during its approach to the outpost. Had engineers needed a closer look at the thermal protection system, a focused inspection would have been ordered up. The fact that none will be required means that the shuttle's heat shield came through the climb to orbit pretty much unscathed. It also means none of the foam seen falling from the shuttle's external tank during launch did significant damage. Managers had said the foam fell away after aerodynamically sensitive early portion of flight. The insulation fell off after the shuttle was out of the densest parts of the atmosphere and could not have generated enough kinetic energy to cause critical damage. The Discovery astronauts will perform one more "late inspection" after the shuttle undocks from the space station to make sure no micrometeoroid debris damage occurs during its weeklong stay at the outpost. Web posted. (2011). [NASA: No Focused Inspection Required [Online]. Available WWW: http://www.floridatoday.com/ [2011, February 27].]

**February 28: Shuttle Stay At Station Extended A Day**

Discovery will remain at the International Space Station an extra day, but a decision still is pending on a unique photo fly-around photo opportunity. Mission managers approved the extension so Discovery's crew can help outfit a cylindrical storage module the astronauts aim to deliver today. A final decision is expected today on a proposal to send a Soyuz crew on a fly-around to photograph the station while the shuttle, a Russian Soyuz space taxi and robotic cargo carriers from Europe, Japan and Russia are docked at the outpost. The Discovery mission represents the only chance to capture images with all the docked

vehicles prior to shuttle fleet retirement. The added day at the station will push back Discovery's landing at Kennedy Space Center to Tuesday. Web posted. (2011). [Shuttle Stay At Station Extended A Day [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, February 28].]

**Space shuttle Endeavour heads to VAB**

Space shuttle Endeavour today moved closer to its own final launch date. Endeavour began rolling from its processing hangar to the Vehicle Assembly Building around 7 a.m. this morning at Kennedy Space Center. Once inside the VAB, Endeavour will be attached to its external fuel tank and twin solid rocket boosters. Endeavour, which will be commanded by astronaut Mark Kelly, is targeting an April 19 launch. It will deliver spare parts and the Alpha Magnetic Spectrometer, a large particle physics experiment, to the outpost. Web posted. (2011). [Space shuttle Endeavour heads to VAB [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, February 28].]

## MARCH

**March 1: Taurus launch of NASA satellite rescheduled**

After being delayed last week by technical problems, a Taurus XL rocket and its Glory satellite will try again for liftoff early Friday [March 4th] from Vandenberg Air Force Base. The launch is planned for 2:09 a.m. from Space Launch Complex-576E. The launch window for this mission is less than a minute because of where the satellite needs to be placed in space. Weather appears ready to accommodate Friday's launch attempt, with no concerns cited and visibility expected to be generally clear. However, if the launch slips to Saturday, forecasters are calling for a 30-percent likelihood conditions would violate rules, with thick clouds cited as the concern. The first launch attempt of the Orbital Sciences Corp. Taurus rocket on Feb. 23 was scrubbed about 10 minutes before liftoff due to faulty ground-support equipment. "Those issues have been resolved," NASA officials said. Web posted. (2011). [Taurus launch of NASA satellite rescheduled [Online]. Available WWW: http://www.lompocrecord.com/ [2011, March 1].]

**NASA hosts 'Tweetups' to spread the word about its missions**

As the space shuttle program winds down, NASA is turning to users of the social networking site Twitter to help document the last launches and to spread the word about the agency's future endeavors. Tweetups, as they are known, bring together 15 to 150 Twitter users for a behind-the-scenes experience at NASA facilities nationwide. The two-hour to two-day events give attendees personal access to scientists, engineers, astronauts and managers. In turn, the attendees share their observations with followers, who could number in the millions. To date, NASA has hosted 15 Tweetups at six locations ranging from New York to California. The program has "been wildly successful," said Stephanie Schierholz, NASA's social media manager. "It [gives attendees] an opportunity to interact with their space agency. . . . It's been a great way for us to engage" the public. During the initial October 2010 launch window for the space shuttle Discovery, for instance, NASA hosted 150 Tweeters at the Kennedy Space Center in Florida. Their Tweets reached close to 2 million people, according to the agency. "NASA can't accommodate hundreds of thousands at a launch," Schierholz said. "We can accommodate 150, [and] if they share with their network, it's more interesting to follow a friend, than to follow the [official] @NASA account," which has about 850,000 followers. Prospective Tweeters register online and are selected randomly. They must pay their own way to the events and cover their own lodging and meal expenses. Schierholz said NASA has been surprised by the high worldwide interest in the Tweetups. A man from Spain flew in to Washington in July 2009 for a two-hour event with the crew from STS-125, a mission to service the Hubble telescope. "That knocked my socks off," she said. "I had no idea people were that interested. It was a very cool surprise." The invitation to Tweet from the Discovery shuttle launch attracted 2,700 registrants, and the150 people selected came from 35 states and six countries. A girl from the United Kingdom stayed in the United States until the actual launch, which was postponed until Feb. 24 for technical reasons; attendees from Australia and the Philippines flew back to the United States. The Australian attendee told Schierholz that she spent nearly $20,000. Web posted. (2011). [NASA hosts 'Tweetups' to spread the word about its missions [Online]. Available WWW: http://www.nextgov.com/ [2011, March 1].]

**NASA Implementation of 2010 Authorization Act Program Offices**

NASA has announced program office assignments at three NASA field centers to align the president's fiscal year 2012 budget request and the NASA Authorization Act of 2010. The agency also has released three Space Technology Program solicitations. NASA will create new program offices to manage human spaceflight activities associated with the development of the Space Launch System, the heavy-lift rocket that will carry humans beyond low Earth orbit; the Multi-Purpose Crew Vehicle, the next human exploration spacecraft; and commercial spaceflight vehicles. "NASA is moving forward to aggressively implement the bi-partisan direction the President and Congress have given us, and these program offices

will help us carry out this important mission," NASA Administrator Charles Bolden said. "The United States continues its leadership role in human spaceflight and these moves will ensure this continues for many years to come." NASA's Johnson Space Center in Houston will host a program office responsible for developing the Multi-Purpose Crew Vehicle. Johnson also will continue to lead the way in human research to enable exploration beyond low Earth orbit. This research heavily leverages the International Space Station. In addition, the center will be critical to efforts to facilitate commercial access to low Earth orbit. NASA's Kennedy Space Center in Florida will lead the way in enabling commercial human spaceflight capabilities and host a program office dedicated to that work. Kennedy will continue to provide launch services to both science missions and commercial crew providers. The Marshall Space Flight Center in Huntsville, Ala., will lead NASA's efforts on a heavy- lift rocket that will carry humans beyond low Earth orbit. The center will house the program office for the Space Launch System and continue to support station operations. NASA also released three Space Technology Program solicitations Tuesday as part of the agency's efforts to develop innovative solutions to enable future exploration and science missions and lower the cost of other government and commercial space activities. Web posted. (2011). [NASA Continues Implementation Of 2010 Authorization Act Program Offices, New Technology Solicitations Announced [Online]. Available WWW: http://www.spaceref.com/ [2011, March 1].]

**House passes bill to avert shutdown**

President Obama entered negotiations over a spending bill Tuesday as Congress was poised to extend the deadline to avert a government shutdown by two weeks. The House of Representatives passed 335-91 a stopgap spending bill to keep the government running through March 18, with $4 billion in spending cuts. Most Democrats voted for the measure, despite a no vote from Minority Leader Nancy Pelosi, D-Calif. Senate Majority Leader Harry Reid, D-Nev., said the Senate will pass the resolution today, allowing Obama to sign it before government spending authority expires Friday. The Senate unanimously passed a bill Tuesday that would prevent members of Congress and the president from getting paid during a shutdown. Web posted. (2011). [House passes bill to avert shutdown [Online]. Available WWW: http://www.usatoday.com/ [2011, March 1].]

**Extra Shuttle Mission Favored Date Moves Up**

Internal NASA thinking on the timing of the agency's hoped-for STS-135 space shuttle mission using the Atlantis orbiter has taken a U-turn, with most now favoring the manifested June 28 launch date. The 11-day supply mission to the International Space Station would mark the end of the 30-year shuttle program. Until recently, NASA station program officials were urging a slip toward late August to ensure the orbiting science laboratory was sufficiently provisioned to support a six-member crew for up to a year, in case U.S. commercial cargo providers face delays in their initial missions. However, with the fiscal 2011 budget still in flux, the June 28 launch date has become much more attractive, according to one of those involved in the NASA planning. The STS-135 mission's viability could be jeopardized if the White House and Congress are unable to agree on a continuing resolution to keep the federal government running beyond March 4, the official says. A shutdown would force all but essential government personnel from working until agreement on a new spending plan is reached. As Discovery's STS-133 mission returns to Earth on March 7 or 8, NASA will turn its attention to the STS-134 flight of Endeavour, which is targeted to lift off on April 19. Endeavour was towed from the Orbiter Processing Facility hangar to the Vehicle Assembly Building at Kennedy Space Center, Fla., on Feb. 28 — its last stop before heading to Launch Pad 39A in March. During an 11-day flight, Endeavour's crew will equip the space station with the Alpha Magnetic Spectrometer, a $2 billion external astronomical observatory for studies of dark matter and primordial anti-matter. The high-profile study of the origin and structure of the universe represents the combined efforts of a dozen countries, including China. Web posted. (2011). [Extra Shuttle Mission Favored Date Moves Up [Online]. Available WWW: http://www.aviationweek.com/ [2011, March 1].]

**March 2:** **Weather iffy for Cape launch Friday**

The forecast is iffy for Friday afternoon's planned launch of an unmanned Air Force space plane from Cape Canaveral Air Force Station. The exact targeted launch time for the second X-37B Orbital Test Vehicle atop a United Launch Alliance Atlas V rocket will be released Friday morning. The window opens at 3:39 p.m. EST; its length has not been disclosed. There's a 70 percent chance that gusty ground winds and cumulus clouds could prevent a launch Friday, and a 60 percent chance if an attempt is made Saturday, according to the official forecast released today. The Atlas V is scheduled to roll from its vertical processing tower to its Launch Complex 41 pad at noon Thursday. According to the Air Force, "The X-37B will provide a flexible space test platform to conduct various experiments and allow satellite sensors, subsystems, components and associated technology to be efficiently transported to and from the space environment where it will need to function." The first OTV mission launched on an Atlas V last April 22 and successfully completed an automated landing at Vandenberg Air Force Base in California on Dec. 3. Web posted. (2011). [Weather iffy for Cape launch Friday [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, March 2].]

**No surprises in who will lead new NASA space programs**

NASA's leading human spaceflight centers in Florida, Texas and Alabama will have responsibility for new heavy-lift rocket, space exploration and commercial crew programs, the agency announced Tuesday. As announced last year, Kennedy Space Center in Florida will lead the management of commercial human spaceflight programs designed to ferry astronauts to and from low Earth orbit. NASA and private partners plan to have commercial crew transportation services running by 2015. The Florida launch site will be the starting point for all of NASA's commercial crew missions to orbit. Companies competing for NASA funding would launch on Atlas, Falcon or Liberty rockets from KSC or neighboring Cape Canaveral Air Force Station. United Launch Alliance's Atlas 5 and SpaceX's Falcon 9 rockets are already flying, and solid rocket motor builder ATK unveiled its own commercial rocket concept called Liberty last month. NASA officials say the rise of commercial rocket and spacecraft operators will give the space agency flexibility to focus on exploration missions beyond low Earth orbit. That's the objective of a heavy-lift rocket and multi-purpose crew vehicle still early in the design stage. Both systems were initiated after the passage of the NASA Authorization Act of 2010, legislation which serves as a blueprint for the agency's activities for the next three years. The massive heavy-lift booster, called the Space Launch System for now, will lift between 70 and 100 metric tons to low Earth orbit. An upper stage could be added later to supply more lift capability. Web posted. (2011). [No surprises in who will lead new NASA space programs [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, March 2].]

**NASA And Florida Tech To Host Space Studies Program 2012**

NASA's Kennedy Space Center and the Florida Institute of Technology, Melbourne, Fla., have been selected to host the International Space University's 25th annual Space Studies Program. The 9-week course, set for June 4-Aug. 3, 2012, is designed for post-graduate university students and professionals. "Kennedy Space Center is looking forward to hosting the 2012 session of the ISU Space Studies Program in partnership with the Florida Institute of Technology," said Bob Cabana, Kennedy Space Center Director. "This is an amazing opportunity, not only for the students participating in the program, but for employees of the center to share their knowledge and experiences with an international network of leading space experts and professionals." The International Space University, or ISU, headquartered in Strasbourg, France, provides an interdisciplinary education experience to support the development of future leaders in the world space community. The site of the Space Studies Program changes annually, enabling a unique educational and international experience. The program curriculum includes sessions in space physical sciences, space systems engineering, policy and law, business and management, space and society, satellite applications, space life sciences and human spaceflight. ["NASA And Florida Tech To Host Space Studies Program 2012," **NASA News Release #12-11**, March 2, 2011.]

**Endeavour secured to external tank**

Kennedy Space Center technicians today finished securely fastening Endeavour to its external tank following Monday's move into the Vehicle Assembly Building. The assembled shuttle is scheduled to begin rolling out to launch pad 39A at 8 p.m. next Wednesday in preparation for a targeted 7:48 p.m. April 19 blastoff. Teams are assessing whether the rollout would be affected if Discovery's planned Tuesday morning landing slipped a day or more due to weather or technical problems. Also still to be determined is whether a tanking test will be performed once Endeavour is at the pad. The tank underwent the same modifications Discovery's did to beef up intertank support beams called stringers to prevent cracks. NASA officials praised the performance of Discovery's tank following last Thursday's liftoff. And Endeavour's is an older model not expected to share the same stringer materials that were problematic on Discovery's tank. Endeavour and six astronauts plan to deliver the Alpha Magnetic Spectrometer to the International Space Station during a 14-day mission led by Mark Kelly, the husband of U.S. Rep. Gabrielle Giffords, who is recovering from a head wound suffered during a Jan. 8 shooting rampage in Tucson. The mission is the last for Endeaovur and the second-to-last planned before the shuttle program is retired. Web posted. (2011). [Endeavour secured to external tank [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, March 2].]

**ATK's $10,000 donation launches shuttle-monument work**

Officials with space shuttle contractor ATK, in town last week for the launch of space shuttle Discovery, brought something with them that pleased leaders of the U.S. Space Walk of Fame Foundation: a check for $10,000. The donation will allow the foundation to start construction of a monument in a downtown Titusville park to recognize shuttle workers. It is the largest single contribution to date for the project, surpassing the $5,000 donated by main shuttle contractor United Space Alliance, according to U.S. Space Walk of Fame Foundation President Charlie Mars. Mike Rudolphi, vice president and deputy general manager for NASA programs at ATK, said it is important to have a monument recognizing shuttle workers at Space View Park, where monuments already exist to the Mercury, Gemini and Apollo programs. Web posted. (2011). [ATK's $10,000 donation launches shuttle-monument work [Online]. Available WWW: http://www.floridatoday.com/ [2011, March 2].]

**March 3: Double Vision: NASA Earth Satellites Prep for Launch**

In a rare event, two NASA launch vehicles currently rise above California's Vandenberg Air Force Base, as NASA's two, new Earth monitoring satellites, Glory and Aquarius, ready for their respective launches. Both the Glory spacecraft and Taurus XL rocket are ready for launch Friday, March 4, at 2:09:43 a.m. PST (5:09:43 a.m. EST). The weather forecast is 100 percent "go," with the possibility of some fog and a low ceiling not expected to be an issue. The liftoff from Vandenberg Air Force Base (Launch Complex 576-E) is targeted for the middle of a 48-second launch window. Spacecraft separation will occur 13 minutes after launch. Technical issues with ground support equipment for the Taurus XL launch vehicle led to the scrub of the first launch attempt on Feb. 23. Meanwhile, nearby, the first stage of the Delta II rocket that will carry NASA's Aquarius instrument into low Earth orbit has been raised onto its launch pad at Vandenberg Air Force Base's Space Launch Complex-2 (SLC-2). Scheduled to launch in June, Aquarius' mission will provide monthly maps of global changes in sea surface salinity. By measuring ocean salinity from space, Aquarius will provide new insights into how the massive natural interplay of freshwater among the ocean, atmosphere and sea ice influences ocean circulation, weather and climate. Aquarius will launch on the Satélite de Aplicaciones Científicas (SAC)-D spacecraft, built by Argentina's Comision Nacional de Actividades Espaciales (CONAE). The SAC-D spacecraft and its Aquarius instrument are scheduled to be shipped from South America to the launch site in late March. The Aquarius instrument was built jointly by NASA's Jet Propulsion Laboratory, Pasadena, Calif., and NASA's Goddard Space Flight Center, Greenbelt, Md. Web posted. (2011). [Double Vision: NASA Earth Satellites Prep for Launch [Online]. Available WWW: http://www.jpl.nasa.gov/ [2011, March 3].]

**Bolden will make decision on orbiters April 12**

NASA chief Charles Bolden told a congressional committee today that he would announce the final resting places for the space agency's shuttle orbiters on April 12- the 30th anniversary of the first shuttle flight. Discovery, now in orbit, is headed to the Smithsonian Institution's National Air and Space Museum. The other two — Atlantis and Endeavour — will go to educational facilities — such as museums — that have yet to be named. Kennedy Space Center Visitor Complex is one of 29 locations seeking an orbiter. It announced plans in December to build a $100 million exhibit as the centerpiece. Bolden was testifying before the House Appropriations subcommittee that overseas NASA's budget. Lawmakers from other states made sometimes humorous pitches. No Floridian sits on the subcommittee. Rep. Norm Dicks, D-Wash., lobbied for the Museum of Flight in Seattle, which gets 450,000 annual visitors. Rep. Steve Austria, R-Ohio, offered Bolden a lapel pin saying, "Land the shuttle in Ohio," where it would reside at the National Museum of the U.S. Air Force at Wright-Patterson Air Force Base. Rep. Chakah Fattah of Pennsylvania, the top Democrat on the panel, suggested the winner should be a state with no other NASA facilities. The audience watching the hearing groaned in amusement. Rep. Jo Bonner, an Alabama Republican whose district lost a $35 billion Air Force contract last week to Dicks' district, said the winning state should be chosen alphabetically, drawing laughs. "We just want to make sure the decision is fair," Bonner said. Bolden assured him it would be. Web posted. (2011). [Bolden will make decision on orbiters April 12 [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, March 3].]

**Atlas V Rocket Rolls Out For Friday Launch**

An Atlas V rocket with a mini military shuttle onboard rolled out to its oceanside launch pad today, but the weather forecast for Friday calls for conditions that could force a delay. The United Launch Alliance rocket and its payload -- the second Air Force X-37B spacecraft -- is scheduled to blast off from Launch Complex 41 at Cape Canaveral Air Force Station sometime after a launch window opens at 3:39 p.m. Friday. An exact time likely will be announced early Friday. The weather forecast calls for a 70 percent chance gusty ground winds or thick, electrically charged clouds will cause a launch postponement. There is a 60 percent chance that conditions would force a delay Saturday and a 70 percent chance of a weather-related delay Sunday. The X-37B is a pilotless craft that will be flying a shake-down cruise in low Earth orbit. The first X-37B was launched aboard an Atlas V last April and made an unprecedented auto-pilot atmospheric reentry and landing at Vandenberg Air Force Base late last year. Web posted. (2011). [Atlas V Rocket Rolls Out For Friday Launch [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, March 3].]

**March 4: Glory launch fails**

A NASA climate satellite failed to reach orbit early Friday in a launch failure eerily similar to one just over two years ago. A Taurus XL rocket lifted off from Vandenberg Air Force Base in California at 5:09 am EST (1009 GMT) carrying NASA's Glory earth sciences spacecraft. However, several minutes after liftoff launch controllers declared a contingency when they received telemetry that the rocket's payload fairing failed to separate as planned. The additional mass of the payload fairing kept the rocket from reaching orbit. The failure appears very similar to the loss of NASA's Orbiting Carbon Observatory satellite in February 2009, also lost when the payload fairing of the Taurus XL launching it failed to separate after launch. Web posted. (2011). [Glory launch fails [Online]. Available WWW: http://www.spacetoday.net/ [2011, March 4].]

**Discovery gets extra day in space**

Not quite ready to roost in retirement, Discovery will stretch out its final flight yet another day, pushing landing at Kennedy Space Center to Wednesday. And in doing so, it looks like NASA's shuttle fleet-leader will end up tallying 39 flights and an entire year in orbit. "We think that when we land Discovery will have flown in space for 365 days, for a whole year, which is pretty incredible," shuttle skipper Steve Lindsey told President Barack Obama Thursday in a call from the White House. "That's a remarkable, remarkable record," Obama said, noting that the orbiter "has traveled more distance in space and spent

more time in orbit than any of its peers in the shuttle fleet." "I'd just like to congratulate everybody at NASA -- all the personnel past and present -- who have spent untold effort in making the space shuttle Discovery a unique part of our history in space." The presidential call to the 12 people aboard Discovery and the International Space Station was the high point of what otherwise was a laid-back day in orbit. After an eight-day blitz that included launch, extensive shuttle heat shield inspections, rendezvous and docking at the space station and two complicated spacewalks, the joined crews took a half-day off. NASA mission managers already had extended the shuttle's stay at the station a day. On Wednesday, they added yet another extra day, so Discovery will remain at the outpost until Monday. The extra time will be used to help the station crew unpack and outfit the storage module that Discovery's crew delivered. Discovery now is scheduled to land at Kennedy's three-mile runway at 11:58 a.m. Wednesday. Web posted. (2011). [Discovery gets extra day in space [Online]. Available WWW: http://www.floridatoday.com/ [2011, March 4].]

**Atlas V launch scrubbed for Friday, could go on Saturday**

Weather scrubbed both attempts to launch an Atlas V rocket today from Canaveral Air Force Station. There will be another shot at the launch on Saturday. The first attempt was for 3:50 p.m., but a thick cloud deck of cumulus clouds had been in the Eastern range as well as winds out of the east from 22 to 28 knots gusting as high as 32 knots. The same poor weather conditions scrubbed the second attempt that was set for 5:27 p.m. Saturday's forecast is dicey as well, with both the cloud and wind concerns only allowing for a 30 percent chance for launch. The rocket is carrying the second of the Department of Defense's reusable X-37B Orbital Test Vehicles. Web posted. (2011). [Atlas V launch scrubbed for Friday, could go on Saturday [Online]. Available WWW: http://www.orlandosentinel.com/ *the write stuff blog* [2011, March 4].]

**March 5: Military tight-lipped after Atlas V liftoff**

An unmanned U.S. military spaceship that looks like a small shuttle lifted off Saturday on a secretive shakedown cruise -- one that could include the deployment and retrieval of a clandestine payload. The Air Force's second X-37B spacecraft blasted off at 5:46 p.m. atop a powerful Atlas V rocket at Cape Canaveral Air Force Station, sending a loud rumble across the Space Coast. Air Force officials said the 196-foot United Launch Alliance rocket performed normally during the early stages of flight. The first X-37B -- or Orbital Test Vehicle-1 -- was launched from Cape Canaveral last April and made an autonomous atmospheric re-entry and landing at Vandenberg Air Force Base last December. Neither the Air Force nor NASA has plans to convert the X-37B into a piloted craft to haul astronauts to and from the International Space Station. Web posted. (2011). [Military tight-lipped after Atlas V liftoff [Online]. Available WWW: http://www.floridatoday.com/ [2011, March 5].]

**March 6: NASA's new building embraces all eco-friendly**

NASA's newest building at Kennedy Space Center won't have an electric bill. Conservation and efficiency measures reduced electricity use by more than 40 percent. And with an 80-kilowatt array of solar panels, the Propellants North Administrative and Maintenance Facility will produce as much electricity as it uses. Its NASA's first carbon neutral building, which features an array of eco-friendly features, including using one-fifth the water compared with a traditional building by collecting rainwater to flush the toilets. "It's bit of a paradigm shift. It becomes how we do business," said Stephen Szabo, vice president and project manager for designer Jones Edmunds & Associates Inc. "The idea is to reduce any cost down the road." As NASA faces budget cuts related to the end of the shuttle program, saving money becomes more important. The project's $4.3 million price, which included the parking lot and demolition of the old structure, was $100,000 under budget, NASA spokesman Allard Beutel said. The Propellants North project consists of a single-story, 1,800-square-foot shop used to store cryogenic fuel transfer equipment and a two-story, 9,540-square-foot administrative building that will house managers, mechanics and technicians who fuel spacecraft. The facility will apply for the U.S. Green Building Council's Leadership in Environmental and Energy Design Platinum status, which is the highest LEED

rating. USGBC awards LEED credits toward the rating based on the project's design and implementation. There only are about 350 Platinum-rated facilities in the United States, including four in Florida. In the U.S., buildings generate 39 percent of carbon dioxide emissions, use 40 percent of energy and consume 13 percent of the water. Greater building efficiency can meet 85 percent of future U.S. demand for energy and generate 2.5 million American jobs, according to the building council. Propellants North incorporates technology as simple as insulated concrete walls and as complex as a system to modulate the lights. NASA officials are thrilled with the predicted cost savings from the building. "How can you not be enthused about something that requires zero energy?" Bob Cabana, KSC director, said in a NASA interview. "This is our start. This is setting the standard." Web posted. (2011). [NASA's new building embraces all eco-friendly [Online]. Available WWW: http://www.floridatoday.com/ [2011, March 6].]

**March 7: Discovery Crew Surveys Heat Shield**

Discovery's astronauts surveyed the heat shielding on the shuttle's wing leading edges and nose cap on March 7, after departing the International Space Station (ISS) for the last leg of the fleet leader's final journey into orbit. Discovery undocked at 7 a.m. EST, as the two spacecraft sailed more than 200 mi. over the Western Pacific Ocean. Discovery's 39th and final mission is scheduled to end March 9 with a landing at NASA's Kennedy Space Center in Florida. There are two landing opportunities — 11:57 a.m. EST and 1:34 p.m. EST — to bring the 13-day flight to a close. Wednesday's weather outlook is favorable. In spite of the two one-day mission extensions, Discovery is provisioned to remain in orbit until March 11. After the undocking, pilot Eric Boe slowly backed the 205,000-lb. orbiter to a distance of 400 ft. from the outpost. There, he initiated a traditional fly-around that ventured to a separation of 600 ft. Aboard the orbiter, the astronauts gathered close-up photographs and video of the station for engineers, who will assess the imagery to document the condition of the hardware, some of which is now more than 12 years old. "We got some amazing shots," Discovery astronaut Mike Barratt told Mission Control. During the 5-hr. damage survey, the astronauts scanned the heat shielding with a 50-ft. inspection boom locked in the grasp of the shuttle's robot arm. The survey data will be assessed by imagery experts before the Mission Management Team gives Discovery's crew permission to descend. Web posted. (2011). [Discovery Crew Surveys Heat Shield [Online]. Available WWW: http://www.aviationweek.com/ [2011, March 8].]

**March 8: Discovery systems ready for re-entry**

Discovery's steering thrusters worked fine during standard day-before-landing tests. The orbiter's Reaction Control System is equipped with 16 forward jets on either side of the nose and 28 rear jets split between pods flanking the tail fin. They'll be used to set up Discovery's deorbit burn, planned at 10:52 a.m. Wednesday, and control it as it begins to enter the atmosphere, before flight control surfaces can take over. Those systems, including wing flaps and the rudder speed brake, were checked out earlier this morning. After the successful tests, the crew will pulse thrusters again as part of a Department of Defense experiment called "RAMBO" that will monitor exhaust plumes to help model systems for future spacecraft. The crew is also packing final pieces of equipment and luggage in preparation for Wednesday's planned 11:57 a.m. landing attempt at Kennedy Space Center. A NASA TV commentator described the latest weather forecast as "fairly favorable." Web posted. (2011). [Discovery systems ready for re-entry [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, March 8].]

**Discovery hoping for Blue Sky**

Discovery astronauts were awakened this morning to a live accoustic performance from Mission Control by Big Head Todd and the Monsters, whose tune "Blue Sky" won a contest to pick wake-up songs for the crew, pulling in 722,662 votes -- nearly 30 percent of the total. "Did you just do that live?" radioed a surprised Discovery commander, Steve Lindsey. "I did just do that live, and I believe it was a first in history," replied band leader Todd Park Mohr. "That was terrific, we really appreciate it." The latest forecast from the Spaceflight Meteorology Group shows scattered clouds but no weather violations that

would prevent a planned 11:57 a.m. EST Wednesday landing at Kennedy Space Center. Discovery's crew of six this morning successfully tested the orbiter's wing flaps and rudder speed brake to make sure they're ready to help steer the ship during its glide through the atmosphere. A test-firing of thrusters is planned around 6:40 a.m. Web posted. (2011). [Discovery hoping for Blue Sky [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, March 8].]

**March 9: Space worker expects day to be solemn one**

A huge team will assemble this morning at Kennedy Space Center's runway several hours before Discovery's planned landing. Ray Zink will coordinate the convoy of 30 vehicles and roughly 160 people that descends on Discovery after it rolls to a stop. They'll make sure the orbiter is in a safe condition, let out the astronauts and tow the spaceship back to a hangar. "When I get back to my office and sit down for a couple minutes, it's probably going to become very surreal what just happened," said Zink, 45, of Orlando, a United Space Alliance manager. It was the same watching Discovery launch. Teams staged at the runway for a potential emergency landing typically cheer together after liftoff and booster separation. "This time it was a little more quiet, just sort of watching it go away," Zink said. He'll walk Discovery back to its hangar and help park it there for the last time, thinking more about colleagues who won't be around to work the next landing as the shuttle program downsizes. Web posted. (2011). [Space worker expects day to be solemn one [Online]. Available WWW: http://www.floridatoday.com/ [2011, March 9].]

**Spacecraft operator anticipates an 'exciting moment'**

Ron Delaney will be the first person to give Discovery's last crew a face-to-face welcome home upon the shuttle's return to Kennedy Space Center today. The 43-year-old Rockledge resident will open the crew compartment hatch while Discovery hums on the runway, its heat shields still warm from re-entry through the atmosphere. "It's going to be an exciting moment," said Delaney, United Space Alliance's lead "spacecraft operator" on landing day. Delaney feels great satisfaction seeing the astronauts' excitement and sense of accomplishment after a mission, knowing he and his colleagues "gave them the best possible bird to go do what they needed to do." That satisfaction will be magnified today. His 11-year career as a shuttle technician will end with shuttle program layoffs planned next month. "I'm excited to catch the last time for Discovery and for me, too," he said. After the astronauts exit, Delaney and partner Greg Rose will enter Discovery's cockpit and start flipping switches to their post-flight positions, powering down some systems for the last time. Delaney will ride in the commander's seat as Discovery is towed from the runway. "I'm going to take a little bit more time to reflect on it this time around," he said. "Being part of the history is just incredible in itself." Web posted. (2011). [Spacecraft operator anticipates an 'exciting moment' [Online]. Available WWW: http://www.floridatoday.com/ [2011, March 9].]

**Reality begins sinking in for space workers**

Mike Cosgrove relaxed. Discovery was safely in orbit, and its three main engines had burned flawlessly during the 81/2-minute climb from Kennedy Space Center on Feb. 24. "We got this thing started off the right way," Cosgrove, the Pratt & Whitney Rocketdyne manager who oversees engines' preparation for flight, remembers thinking. Only today does he expect the reality of Discovery completing its last flight -- and the shuttle program's imminent end -- to begin sinking in when cameras first spot the orbiter as a distant dot. "I just wish at that point he would slow down so we can enjoy that one last approach and landing," said the 56-year-old Merritt Island resident. Next month, Cosgrove's teams will remove Discovery's engines for servicing, as after any flight. But it won't be the same. "They don't really have a need anymore," Cosgrove said. "It's like now we're practicing, and there's no ball game to go play for these motors again." The engines will be set aside until NASA decides whether they should be used for testing or possibly on a new heavy-lift rocket. Cosgrove will take pride in how well his engines and the shuttle have performed recently. "We're going to walk around that vehicle and go, 'my gosh, it's working so well, and these missions have gone so well,' " he said. "You just wish that we could keep doing it."

Web posted. (2011). [Reality begins sinking in for space workers [Online]. Available WWW: http://www.floridatoday.com/ [2011, March 9].]

**Discovery's final landing marks beginning of the end**

Enduring the heat of re-entry one last time, the shuttle Discovery dropped out of orbit and returned to Earth Wednesday to wrap up a near-flawless 39th and final mission, a milestone marking the beginning of the end for NASA's winged rocketships. After firing its twin braking rockets for a computer-controlled descent halfway around the planet, commander Steven Lindsey took over manual control and guided Discovery through a 250-degree left turn to line up on runway 15. Pilot Eric Boe then deployed the ship's landing gear and the 204,000-pound shuttle swooped to a tire-smoking touchdown on runway 15 at 11:57:17 a.m. EST (GMT-5). Lindsey had no problems with a stiff 25-knot headwind and a few moments later, NASA's oldest surviving space shuttle rolled to a halt, wrapping up a career spanning some 5,750 orbits, 148 million miles and 365 days in space during 39 missions since its maiden launch in August 1984. "And Houston, Discovery, for the final time, wheels stopped," Lindsey radioed flight controllers in Houston. "Discovery, Houston, great job by you and your crew," replied astronaut Charles Hobaugh in mission control. "That was a great landing in tough conditions and it was an awesome docked mission you all had. You were able to take Discovery up to a full 365 days of actual time on orbit. I think you'd call that a fleet leader and a leader of any manned vehicle for time in orbit. So job well done." With only two more missions left on NASA's shuttle manifest -- a flight by Endeavour in April and a final voyage by Atlantis in late June -- Discovery's landing marked the beginning of the end for the world's most complex -- and expensive to operate -- manned rocket. "We're seeing a program come to a close here and to see these shuttles, these beautiful, magnificent flying machines end their service life is obviously a little bit sad for us," Barratt said earlier this week. "But it is about time, they've lived a very long time, they've had a fabulous success record, they've built this magnificent space station, they've given us lots of science and a tremendous amount of experience of just how to operate in space. More than anything, we look forward to seeing them retire with dignity and bringing on the next line of spaceships." Lindsey, Boe, Barratt and their crewmates -- Nicole Stott and spacewalkers Stephen Bowen and Alvin Drew -- were expected to be welcomed home by NASA Administrator Charles Bolden, shuttle program manager John Shannon and scores of other agency managers and engineers who turned out for Discovery's final homecoming. "When we walk away from her on the runway after we land, there's going to be tears in my eyes, I know," Stott said of Discovery. "I worked with her at Kennedy Space Center and the chance to fly (the last mission) has just been a real, real privilege." With Discovery safely back on Earth, engineers in the nearby Vehicle Assembly Building made final preparations to haul the shuttle Endeavour to launch pad 39A Thursday for work to ready the ship for its 25th and final launch April 19. If all goes well, NASA will close out the shuttle program by launching the Atlantis June 28 on a final space station resupply mission. Discovery's landing brought that long-awaited -- and to some, long-dreaded -- end game into sharp focus. Barratt captured the thoughts of many space workers when he reflected on the shuttle program's legacy from orbit. "I think about this space shuttle fleet like the clipper ships that were strong and fast and powerful, they did their jobs but they were also graceful and beautiful," he said. "They conjured up imagination, of foreign travel, exotic places, of exploration. And Discovery is just an elite member of this elite fleet." Over the next few months, Discovery will be decommissioned and ultimately turned into a museum display. NASA has not yet announced where the orbiters will end up, but it's widely expected that one of them will be displayed at the Smithsonian's National Air and Space Museum. The contract authorizing construction of Discovery was awarded Jan. 29, 1979, and initial work to begin building the crew module began the following August. The spacecraft was completed at North American Rockwell's Palmdale, Calif., plant in October 1983 and was ferried to the Kennedy Space Center Nov. 9, 1983. Web posted. (2011). [Discovery's final landing marks beginning of the end [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, March 9].]

**March 10: Work Begins on Exploration Park at NASA KSC**

Site work has begun on Exploration Park, the high-tech research and office park being developed by The Pizzuti Companies in partnership with Space Florida. Tom Harmer, senior vice president for The Pizzuti Companies, said the initial work includes clearing the site, transporting fill dirt and initial site grading. Work on this phase of the project is expected to take approximately eight weeks to complete, Harmer said. "We are thrilled to see the park making progress and look forward to showcasing this unique offering to customers," noted Space Florida President Frank DiBello. "We're excited to begin this portion of the project and to take the next steps toward creating a world-class office and technology park," Harmer said. "We are actively engaged in discussions with a number of potential tenants as we prepare the site for the start of vertical construction." Pizzuti is serving as Master Developer of Exploration Park in a public/private partnership with Space Florida, the State's aerospace economic development organization. Civil engineering services are being provided by Jones Edmunds and Titusville-based RUSH Construction is the project's general contractor. The fill dirt being used to develop the first phase of the Park has been donated by Port Canaveral as part of a cooperative agreement between Space Florida and the Port. Exploration Park's initial 60-acre phase, located just outside the security gates at Kennedy Space Center, will accommodate approximately 350,000 square feet in up to nine separate LEED-certified buildings, expected to include educational, office, research/lab space and flexible high-bay facilities. A second 139-acre phase has also been identified. Web posted. (2011). [Work Begins on Exploration Park at NASA KSC [Online]. Available WWW: http://www.spaceref.com/ [2011, March 10].]

**Busy times at the Cape Continue with Delta Launch**

A medium-class version of United Launch Alliance's Delta 4 rocket will give a lift to the National Reconnaissance Office and a clandestine cargo Friday night with blastoff from Cape Canaveral. The launch is targeted for 5:57 p.m. EST (2257 GMT) from Complex 37 for the classified satellite deployment mission. Weather forecasters are predicting 90 percent odds of acceptable conditions for launch, with only a sight concern of winds gusting to the 20-knot limit. The cold front bringing wet weather across Florida on Wednesday night into Thursday is expected to clear out, leaving a launch time outlook on Friday night to include just a few low clouds, some scattered high cirrus, north-northwesterly winds of 10 peaking to 15 knots and a temperature of 65 degrees F. Favorable conditions are supposed to continue through the weekend, if the backup launch opportunities are needed Saturday and Sunday. The Delta 4 will head eastward after liftoff, its pair of strap-on solid motors delivering an added boost of thrust to the vehicle's cryogenic main engine for the initial ascent. The rocket is known as the Medium+4,2 configuration, which flew the Delta 4's maiden mission in 2002 and several times since then. Web posted. (2011). [Busy times at the Cape Continue with Delta Launch [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, March 10].]

**NASA Prepares Antimatter-Hunting Detector for Space Shuttle Launch**

A high-tech astrophysics experiment that will probe the mysteries of our universe is getting ready to fly to the International Space Station aboard the space shuttle Endeavour when it launches on its final mission next month. The Alpha Magnetic Spectrometer (AMS) is a particle physics detector that will primarily measure high-energy particles in space, called cosmic rays, and search for signs of antimatter and mysterious dark matter in the universe. "The most exciting objective of AMS is to probe the unknown – to search for phenomena which exist in nature that we have not yet imagined nor had the tools to discover," said MIT physicist Samuel Ting, a Nobel laureate and AMS principal investigator, March 10 at NASA's Kennedy Space Center in Cape Canaveral, Fla. The $1.5 billion experiment is set to ride up to the space station in the shuttle Endeavour's payload bay. Endeavour's STS-134 mission, the last for NASA's youngest orbiter, is set to launch April 19 from the agency's Florida spaceport. The AMS is currently housed in the Space Shuttle Processing Facility at the Kennedy Space Center. Technicians are completing final preparations before it is stored in a protective canister and then loaded into Endeavour's payload bay on March 25. The AMS is funded by the U.S. Department of Energy, and its construction, testing and operation involves over 600 physicists from 60 institutions representing 16 countries. Web

posted. (2011). [NASA Prepares Antimatter-Hunting Detector for Space Shuttle Launch [Online]. Available WWW: http://www.space.com/ [2011, March 16].]

**March 11: New space satellite rockets into space, 3rd launch in just over 2 weeks**

An unmanned Delta 4 rocket lifted off at sunset from Cape Canaveral Air Force Station, following a delay because of concerns over winds. It hoisted a satellite for the National Reconnaissance Office. The reconnaissance office is keeping mum about the purpose of the satellite. It was the third rocket launch from Florida's Space Coast in just over two weeks. Space shuttle Discovery blasted off on its final mission Feb. 24. Then the Air Force sent a secretive, unmanned space plane into orbit on March 5. The X-37B, resembling a mini-shuttle, is supposed to land back on Earth, but authorities are not saying when. It's the second experimental vehicle of its type to fly in space. Web posted. (2011). [New space satellite rockets into space, 3rd launch in just over 2 weeks from Cape Canaveral [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, March 11].]

**Endeavour poised on launch pad for April 19 liftoff**

Space shuttle Endeavour stood poised this morning on Kennedy Space Center launch pad 39A, after making its final planned trip from the Vehicle Assembly Building. Thousands of KSC workers and their families braved chilly weather and watched the majestic spectacle as Endeavour, mounted atop a mobile launcher platform and bathed in powerful xenon floodlights, was hauled toward the pad by an Apollo-era crawler-transporter. The orbiter reached the pad at 3:49 a.m. Running 24 hours late as a result of stormy weather, the rollout came just a day after sistership Discovery landed here at KSC on its 39th and final flight. Endeavour's crew is led by Mark Kelly, the husband of U.S. Rep. Gabrielle Giffords, D-Ariz. Giffords was critically injured during a Jan. 8 assassination attempt in Tucson that killed six people and wounded more than a dozen others. Four mission specialists also are on the crew: Greg Chamitoff, Andrew Feustel, Michael Fincke and Roberto Vittori of the European Space Agency. The Endeavour launch is scheduled for 7:48 p.m. April 19. A three-day countdown is slated to pick up at 5:43 p.m. April 16. Web posted. (2011). [Endeavour poised on launch pad for April 19 liftoff [Online]. Available WWW: http://www.floridatoday.com/ [2011, March 11].]

**March 13: Wings In Orbit – Wayne Hale Interview**

In an interview with NASASpaceflight.com, former Space Shuttle Program (SSP) manager Wayne Hale spoke about the upcoming book on the history of the Shuttle, "Wings In Orbit," his role in the project, and about what he is doing today. "Wings In Orbit: Scientific and Engineering Legacies of the Space Shuttle" is due to go on sale next month. *Q: How did you get involved in the book? Were you involved at its inception?* Mr Hale: A lot of people had the idea that we should do something to document the Shuttle program — I'm talking about after the President's [George W. Bush] speech in January, 2004, where he announced we're going to end the Shuttle program. Many of us had been working on the Shuttle program for our entire career at the agency, and there was a lot of talk about how do we capture the knowledge. We have a knowledge capture office, people are supposed to write down lessons that they've learned — design, test, and operations — things that go into the next program. I have one of the books from Apollo that's along those lines, it's fascinating. And these days it's all got to be electronic — everybody wants to build a database, put it in some kind of relational database so you can search it — and that's good and there are people doing that. But that's not going to talk to the public. We put together an editorial board, a really impressive editorial board, to help us scope out 'what should we talk about,' what are the parameters. And then as chapters started coming in, we'd review the chapters [and decide] 'yeah, this is good, this is what we want' or 'no, we missed the mark, let's go back and redo some things.' So it's really been a labor of love. There are…two or three hundred different people that have provided written material to this book, so it's not any one person's book. I'm just pleased that I was able to be in the right place at the right time to push it over the hump to get it from just a coffee table conversation to a real project. And…Dr. Helen Lane, who works out of the Sciences Office at JSC, and has published other articles, is really the key person who has done the yeoman's job of organizing the book — she's the 'project

manager,' I guess you would say, that has seen it through. And she gets the lion's share of the credit, if anybody does. We've got articles by astronauts, flight controllers, designers, testers, people at KSC, people at Marshall, people all around the agency that have worked on the Shuttle. So I think it's a pretty comprehensive book and the biggest problem we had was keeping it to one volume. This is not an engineering book, we were aiming for the 'Scientific-American' kind of level; this is not a novel, it's not a light read, but on the other hand, it's not as technical as most NASA technical publications are. It's a history — what did we set out to do, how was it done, what did we accomplish. So some of the engineering sections may be a little tough sledding for some people if they're not technical; on the other hand, there are history sections that I think will be very interesting to people that aren't technical or to technical people, as well. 'No equations, no equations.' *Q: How does the book address the Shuttle's legacy?*Mr Hale: That's the book, that's the subtitle — what did we actually accomplish? What did it mean to the American people? There's a whole section on the culture — what did it do for not just American culture, but world culture. So we're trying to hit that. I suspect that when the book comes out and people get copies of it, like every other book or movie or anything else that comes out, there are going to be critics that say 'well, they missed the mark' or 'they didn't have this right' — I'm fully expecting that, because it's not perfect. But it's our attempt to put the story together, to tell it from the perspective of the folks who were in the program, [that] actually designed, built, flew, operated, got the scientific results from [the Shuttle] and tell it from our point of view. And hopefully it will make a pretty impressive case that the Shuttle was really good. When I say really good, I mean it really contributed to the advancement of technology, engineering, and even in social fields. Web posted. (2011). [Wings In Orbit – Wayne Hale Interview [Online]. Available WWW: http://www.nasaspaceflight.com/ [2011, March 13].]

**March 14: Space Shuttle Worker Dies in Fall at Launch Pad**

A space shuttle technician fell to his death this morning (March 14) from a launch pad at NASA's Kennedy Space Center in Cape Canaveral, Fla. James D. Vanover, 53, a swing arm engineer for NASA contractor United Space Alliance, fell from an elevated level on Launch Pad 39A, where the space shuttle Endeavour is being prepped for launch, around 7:40 a.m. EDT (1140 GMT), the space agency said. He died shortly afterward. "NASA emergency medical personnel did respond but they were unable to revive the man," NASA spokesman Allard Beutel told SPACE.com. Further details were not immediately available. Beutel said NASA has begun an official investigation into the incident. "Our heartfelt sympathy goes out to the family of Mr. Vanover," said United Space Alliance chief executive officer Virginia Barnes. "Our focus right now is on providing support for the family, and for his coworkers. We are also providing our full support to investigating officials in order to determine the cause of the incident as quickly as possible." Vanover had worked at Kennedy Space Center for 28 years. Following the accident, the space agency halted all work on Launch Pad 39A for the rest of the day and was offering counseling to its employees. "We have about a week's worth of cushion in the schedule, so I would not anticipate it," Beutel said of the possibility of a delay, "but at the moment that's not our focus." Web posted. (2011). [Space Shuttle Worker Dies in Fall at Launch Pad [Online]. Available WWW: http://www.space.com/ [2011, March 14].]

**Space industry officials hoping to sway lawmakers in Tallahassee**

About 70 space industry representatives will visit with Florida lawmakers on Wednesday to urge them to remember the $8 billion industry that employs 84,000 workers statewide and faces the loss of a quarter or more of those jobs as the shuttle stops flying this year. "This is a tough time and that's why this is probably the most important year we've had," said Kevin Hoshstrasser, site director for Boeing Florida Operations and Florida Space Day 2011 co-chairman. On the annual trip to Tallahassee, teams from the space industry hope to visit all 160 state lawmakers to encourage them to keep Florida friendly to the space industry, support worker retraining and to present a unified front in dealings with the federal government, which drives the U.S. space industry with dollars from NASA. Apollo 16 astronaut Charlie Duke, the 10th man to walk on the moon, will add star power to the effort. With the shuttle program

ending and NASA's direction being debated in a contentious, budget-cutting Congress, state support of the space industry is crucial, Frank DiBello, Space Florida president and Space Day co-chairman, said. "The picture in Washington, D.C., does not provide a lot of political clarity to ease that anxiety," DiBello said Monday while in the nation's capital working to secure NASA projects for Brevard County. Last year, the state legislature awarded $11 million to Space Florida for infrastructure. This year's allocation has yet to be determined and the agency's operating budget is flat. Web posted. (2011). [Space industry officials hoping to sway lawmakers in Tallahassee [Online]. Available WWW: http://www.floridatoday.com/ [2011, March 14].]

**Russian rocket price hike for US astronauts, Soyuz spacecraft - $63 million**

The Russians are hiking the price of rocket rides again for U.S. astronauts — to nearly $63 million. The price goes up in 2014 for an astronaut to fly to and from the International Space Station on a Russian Soyuz spacecraft. NASA announced the news Monday. The previous contract charged just under $56 million apiece. The contract extension with the Russian Space Agency totals $753 million. That covers trips for a dozen astronauts from 2014 through 2016. NASA officials say inflation is the reason for the latest price increase. Web posted. (2011). [Russian rocket price hike for US astronauts, Soyuz spacecraft seat soaring to $63 million [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, March 14].]

**Registration Opens For NASA Tweetup**

Any space enthusiast would launch at the chance to kick back and chat with astronauts, get a special tour of Kennedy Space Center and a front-row seat to the next historical shuttle launch. NASA is giving the public a chance at exclusive access to KSC. NASA will host a two-day tweetup for 150 of its Twitter followers on April 18 and 19. Registration for the tweetup opens at noon on Monday. NASA says 150 of its followers will be chosen at random to tour KSC before watching Space Shuttle Endeavour launch from the Cape. The followers will also get to talk with NASA managers, astronauts and shuttle technicians. Shuttle Endeavour's final flight is set to lift off at 7:48 p.m. on April 19. Web posted. (2011). [Registration Opens For NASA Tweetup [Online]. Available WWW: http://www.wesh.com/ [2011, March 14].]

**NASA Gears Up For Endeavour Engine Tests**

NASA aims to put Endeavour's main engines through a flight readiness test today, work that would keep the agency on track for a scheduled mid-April launch of the orbiter's 25th and final flight. Now poised on launch pad 39A at Kennedy Space Center, Endeavour and six astronauts are slated to blast off at 7:48 p.m. April 19 on a mission to deliver a large cosmic ray detector to the International Space Station. The particle physics experiment package is designed to give scientists a better understanding of the origins and evolution of the universe. The engine test involves flowing gaseous helium through the shuttle's main propulsion system and engines in an attempt to detect any leaks. Engine valves are cycled just as they will be on launch day. The test follows a busy weekend in which technicians continued post-rollout launch-pad validations and did prep work in advance of the hazardous loading of toxic rocket propellants into tanks that feed Endeavour's twin orbital maneuvering engines and its 44 nose-and-tail steering jets. Endeavour's crew is led by veteran NASA astronaut Mark Kelly, the husband of U.S. Rep. Gabrielle Giffords, D. Ariz., who was critically wounded in a Jan. 8 assassination attempt that killed six people and injured more than a dozen in Tucson. NASA and a Houston rehabilitation hospital are making advance preparations to transport and host Giffords at KSC on launch day if her condition by then is good enough that she could travel. The crew also includes pilot Gregory "Box" Johnson and four missions specialists: Greg Chamitoff, Andrew Fuestel, Michael Fincke and Roberto Vittori of the European Space Agency. Web posted. (2011). [NASA Gears Up For Endeavour Engine Tests [Online]. Available WWW: http://www.floridatoday.com/ [2011, March 14].]

**Space shuttle Discovery to be 'autopsied' before shipping to Smithsonian**

After landing back on Earth for a final time last week, space shuttle Discovery is all but officially destined for the Smithsonian. Before it can be turned over to the Washington institution however, Discovery is slated to undergo an autopsy of sorts, providing NASA engineers one last chance to learn what they can by cutting into the world's most flown spacecraft in history. NASA's third shuttle orbiter to be built and its first to reach retirement, Discovery capped off a career total of one year aloft with the 13-day STS-133 mission, which installed the last of the pressurized modules or rooms for the U.S. side of the International Space Station (ISS). Discovery and its six crew members touched down on March 9, marking the end of Discovery's 39th and final spaceflight. With no next launch however, the shuttle technicians who previously worked to build up Discovery for its next flight will instead tear into the shuttle to excise many of its key components for study, to save for future programs and to make the vehicle safe for public display. "It's not as quick as you might think," said Mike Leinbach, NASA's shuttle launch director. "It is many, many months away before we'll be ready to hand [Discovery] over." "We are going right into what we are calling our 'transition retirement' processing flow, which in many ways is very similar to the processing flow to get the vehicle ready for flight again. It is just this time, we are not preparing her for flight, we are preparing her for display," Stephanie Stilson, flow manager for orbiter retirement, told collectSPACE. Up until STS-133, Stilson oversaw Discovery's processing as its dedicated flow manager. "The first part of that schedule is to go in and do what we call 'down mission processing,' and that is very similar to what we'd do if we were going to fly again. Every vehicle once it lands has to go through some securing and safing that has to happen right away," said Stilson. Leinbach detailed some of the work at a press conference following Discovery's landing. "We have to get the cryogenic [propellants] out of the fuel cell system, there are some [hypergolic fuels] we need to drain, those types of things," said Leinbach. "Pyrotechnic cartridges need to be removed. Those types of things are all very standard and that [takes] a couple of weeks." After that work is complete, Discovery will enter a phase Stilson called "transition and retirement safing." "In other words, to have the general public be able to be up and close and personal with Discovery, there are a lot of hazardous commodities we have to remove," explained Stilson. According to launch integration manager Mike Moses, the systems to be stripped out of Discovery include ammonia, nitrogen tetroxide and monomethylhydrazine, all of which could pose a risk to future museum visitors if left intact. "We have talked about do you try to just decontaminate all the lines or just remove them. In some instances, we're going to remove the plumbing," said Moses. As Stilson and her team work to make Discovery safe for display, they will also be asked to remove components for forensic study, said Bill Gerstenmaier, NASA's associate administrator for space operations. "We can still learn a lot from these vehicles. There are some hydraulics systems and some other things that we haven't really had a chance to have a look at because it was really too invasive to get in there and take a look at it," explained Gerstenmaier. Not all the components to be removed from Discovery will be set aside for study; some will be saved to be reused in the next generation of U.S. spacecraft. Some of the decisions as to what systems will or will not be taken out of Discovery are dependent on what its next owners desire. "It all depends on the specific display site that is getting that orbiter, so until that is decided, we haven't started negotiations as to what equipment they want," explained Moses. "Do they want it in an historical preservation? Do they want engines installed or on the side?" Taking all three phases into consideration, Stilson says it will be next year before Discovery can ship (presumably) to the Smithsonian. "We've developed a schedule which says that we should be ready to ferry Discovery most likely in January of next year," she said. "That's the schedule that we have right now. There is no hard constraint that we're working to, it's more of putting the schedule together based on the work that has to happen that we know of right now." Web posted. (2011). [Space shuttle Discovery to be 'autopsied' before shipping to Smithsonian [Online]. Available WWW: http://www.collectSPACE.com/ [2011, March 14].]

**SpaceX wins launch contract from SES**

SpaceX will launch a communications satellite for SES, the first launch deal the entrepreneurial launch company has won from a major satellite operator. SpaceX will launch the SES-8 satellite for SES in the first quarter of 2013 on a Falcon 9 from Cape Canaveral, the companies announced Monday. SES-8 is a

medium-sized communications satellite being built by Orbital Sciences and will operate from 95 degrees east. The contract is the first time one of the big four satellite operators (Eutelsat, Intelsat, SES, Telesat) has purchased a launch from SpaceX, a signal that traditionally risk-averse customers like major satellite operators have become comfortable with the Falcon 9, which launched successfully twice last year. Falcon 9 prices start at around $50 million, significantly less than other commercial launchers with similar capacities. Web posted. (2011). [SpaceX wins launch contract from SES [Online]. Available WWW: http://www.spacetoday.net/ [2011, March 15].]

**March 15: Work resumes at shuttle launch pad**

Kennedy Space Center teams have resumed work at launch pad 39A to prepare Endeavour for an April 19 flight, a day after colleague died in a fall from the pad. In meetings with NASA and United Space Alliance managers this morning, employees said they were ready to resume their work despite shock over the incident, which is under investigation. Managers advised the workers to stand down whenever they felt it necessary to compose themselves and work safely. An employee assistance program staff member is stationed at the pad for the remainder of the week. Today's work at the pad includes checks of the system that provides cryogenic propellants to the shuttle's three fuel cells, which combine liquid hydrogen and liquid oxygen to generate the electricity that powers the shuttle during flight. Web posted. (2011). [Work resumes at shuttle launch pad [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, March 15].]

**Another commercial imager picks Atlas 5 for launch**

Having already won the competition to launch one commercial Earth-imaging satellite, the Atlas 5 rocket has been picked by the rival spacecraft company to deploy its bird too. Atlas 5 boosters will launch both next-generation craft in the coming years from Vandenberg Air Force Base, California. The first mission was announced last September by Dulles, Virginia-based GeoEye, Inc., to launch the GeoEye 2 spacecraft in 2012. The new deal announced Tuesday will carry the WorldView 3 craft into orbit in 2014 for operator DigitalGlobe of Longmont, Colorado. Atlas 5 has performed nine commercial missions since 2002 and these two Earth-imaging launches join the rocket's large manifest of government payloads. A 401-configuration of the Atlas 5 vehicle will be used for both the GeoEye 2 and WorldView 3 missions to reach sun-synchronous orbits covering the planet from pole to pole. United Launch Alliance performs the Atlas flight operations while Lockheed Martin oversees the commercial management of the two missions. GeoEye and DigitalGlobe are competitors in the market to sell high-resolution imagery to U.S. national security analysts, as well as urban planners, real estate developers, oil and gas firms, environmental interests and even online sites like Google Earth. Web posted. (2011). [Another commercial imager picks Atlas 5 for launch [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, March 15].]

**Kennedy Space Center probes illegal-drug find**

NASA is investigating the finding of apparent illegal drugs at Kennedy Space Center for the second time in a little more than a year. Preliminary field tests indicated that 4.2 grams of a white powdery substance found March 7 was cocaine, said Renee Juhans, a spokeswoman for NASA's Office of Inspector General, which is conducting the investigation. "The substance is now at an accredited crime lab for further testing," she said. "We are doing an investigation," she said. Juhans could not immediately confirm the facility where the substance was found. A Kennedy spokesperson referred questions to the inspector general's office, which handles cases that could result in a federal prosecution for drug possession. The investigation follows one initiated in January 2010 after a small plastic bag containing cocaine residue was found outside a restroom in the restricted hangar where shuttle Discovery was prepared for flight. Roughly 200 space center employees were tested with no positive results for cocaine. The investigation was closed without disciplinary action. An unconfirmed number of employees have been asked to take drug tests in connection with the new investigation. NASA and its contractors have zero-tolerance drug

policies, and all center employees may be randomly tested. Web posted. (2011). [Kennedy Space Center probes illegal-drug find [Online]. Available WWW: http://www.floridatoday.com/ [2011, March 15].]

**Senators worry about NASA's 'focus' but offer no ideas**

A U.S. Senate hearing on Tuesday turned into a case of déjà vu all over again. As they have for a year, senators complained about President Barack Obama's decision to kill the Constellation moon-rocket program – which Congress agreed last fall to do – and use commercial rockets to supply the space station while NASA focuses on developing new space technologies. And as NASA prepares to shut down the space shuttle program this summer, the senators offered no alternatives to avoid the loss of 7,000 Kennedy Space Center jobs and the virtual mothballing of the 50-year-old launch center. "The [Obama] outline was rejected but now it seems to be coming back in another form," griped veteran U.S. Sen. Kay Bailey Hutchison, R-Texas, who added that she didn't "want to see another year pass" of NASA stumbling forward "without focus." That outcome, however, is looking increasingly unavoidable. Though Congress and the White House agreed last fall that NASA would build a new heavy-lift rocket by late 2016, the agency says it lacks the money to meet that deadline. NASA officials are expected in coming months to release a construction schedule for the rocket, but few in the space community are confident it will fly in the next six years. Compounding the concerns are recent moves by Congress to slash NASA's budget. A new stopgap spending bill to keep the government funded through April 8 – which passed the House Tuesday -- includes $6 billion in cuts, including $63 million from NASA's cross-agency support division, which touches on every part of the agency. NASA officials did not address the latest cut, but Woodrow Whitlow, Jr., the agency's associate administrator for mission support, estimated that the earlier $298 million cut would mean the loss of roughly 4,500 NASA contractor jobs, with close to 800 coming from KSC. "A cut of that magnitude would be equivalent to shuttering two of our smaller centers," Whitlow told the committee. NASA officials remained confident, however, that the agency still would have enough money to fly its remaining two shuttle missions, including a scheduled June 28 launch of Atlantis. Web posted. (2011). [Senators worry about NASA's 'focus' but offer no ideas [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, March 15].]

**March 16: Officials mark Space Day in Tallahassee**

NASA, Kennedy Space Center, the Air Force's 45th Space Wing and contractors are working the halls of the Capitol today in an annual ritual known as Space Day. It couldn't come at a darker time as Space Coast lawmakers scramble for every available penny to offset the approximately 9,000 aerospace layoffs connected to the retirement of the shuttle fleet. Brevard delegation members will have to fight for tax incentives and economic development programs as Republican leaders deal with a projected $3.6 billion budget shortfall and the directive to keep $1 billion leftover in reserves. Just to help remind lawmakers of better times for the agency, NASA has trotted out Apollo 16 astronaut Charlie Duke as a space ambassador. From April 16-27 in 1972, the fighter and test pilot spent more than 20 hours on the lunar surface in what was then the longest and most challenging lunar mission to date. Space Day culminates this afternoon on the 22nd floor of the Capitol with a reception. The guest list includes Lt. Gov. (and Navy veteran) Jennifer Carroll and Senate President Mike Haridopolos, R-Merritt Island. Web posted. (2011). [Officials mark Space Day in Tallahassee [Online]. Available WWW: http://www.floridatoday.com/ [2011, March 16].]

**March 17: One final CR, and planning for 2012**

Yesterday the Senate passed yet another short-term continuing resolution (CR), extending funding for the federal government for three more weeks, through April 8. That CR cuts $63 million from NASA, targeting earmarks left over from the agency's FY2010 spending bill. This CR is likely to be the last such stopgap measure before "the decisive showdown next month" on a final FY11 spending bill, POLITICO reports. That echoes comments made earlier this week by Sen. Kay Bailey Hutchison (R-TX) at a Senate Commerce Committee hearing about NASA, where she said that "the sentiment on the Hill now" is that this short-term CR would be the last. While the final FY11 spending bill remains uncertain, lobbying

continues about FY2012 appropriations. Space News reported late Thursday that two House members have asked a key lawmaker to protect NASA's human spaceflight programs from potential budget cuts. Reps. Sandy Adams (R-FL) and Pete Olson (R-TX) asked Rep. Paul Ryan (R-WI), chairman of the House Budget Committee, which sets overall spending levels for appropriators, to preserve funding for NASA human spaceflight programs, while suggesting that NASA's Earth science programs, home to what Adams and Olson call an "overabundance of climate change research", could be ripe for cuts. This argument for human spaceflight versus Earth sciences isn't new, but this letter suggests a change in their approach. In the Adams/Olson letter to Ryan, though, they seem to be conceding that NASA's budget will be cut, and want to direct those cuts away from human spaceflight. "To be clear, we believe that NASA's budget can be reduced," they write, as quoted by Space News, arguing that those cuts come from Earth science and not human spaceflight but apparently not suggesting that money be transferred from Earth sciences to human spaceflight. Web posted. (2011). [One final CR, and planning for 2012 [Online]. Available WWW: http://www.spacepolitics.com/ [2011, March 17].]

**NASA budget leads to layoffs**

Already coping with thousands of layoffs tied to the shuttle program's end, Kennedy Space Center is cutting more jobs because of flat federal funding so far this year. About 150 positions are expected to be eliminated by April 1 to reduce costs associated with the center's day-to-day operations. Custodial, library, health, security and transportation services are among those affected by reductions in hours or staffing. The services are funded under the center's roughly $369 million Management and Operations budget, which is separate from programs such as the shuttle and International Space Station. "I know that these reductions will not be easy," center Director Bob Cabana wrote in a memo to employees last month. "All of the changes have been thoroughly considered, and we believe they are the best possible solutions to a very difficult problem." The problem is that the space center, like the rest of NASA, has been operating at 2010 funding levels for nearly the first half of the 2011 fiscal year while Congress has haggled over the budget. While funding has remained flat, costs for various contracts and goods have increased, creating a $33 million shortfall. Officials say the situation is made worse by a rule change that prevents money being rolled forward from one budget year to the next, limiting flexibility to adjust to some cost increases. Cabana's memo said spending freezes and other initiatives already implemented had reduced the shortfall by half, but that cuts to services and jobs were necessary to make up the rest. Among the service cuts being implemented are: Closing a medical clinic, fitness center and graphics shop and eliminating shuttle bus service; Reducing the hours that badging offices and two security gates are staffed; Making library services and a spaceport news magazine available online only; Longer turnaround times for laboratory service. With the latest temporary federal budget set to expire Friday, an extension through April 8 was expected to again avert a government shutdown. That's the same day an estimated 700 to 800 KSC workers will be laid off as part of planned shuttle program reductions. Several thousand more layoffs will follow after the last mission, which is now targeted to launch June 28. Some in Congress are pushing for deep federal spending cuts this year that could affect more KSC jobs. The center now employs about 11,100 contractors and 2,100 civil servants. Only contractors are affected by the recently announced cuts. Web posted. (2011). [NASA budget leads to layoffs [Online]. Available WWW: http://www.floridatoday.com/ [2011, March 17].]

**Grand Turk Attraction Earns Top Honors from Porthole Magazine**

At a ceremony held earlier this week at the annual Cruise Shipping Miami convention, the Grand Turk Cruise Center was presented with Porthole Magazine's Editor-in-Chief Award for "Best Interactive Cruise Exhibit" for its new attraction that pays tribute National Aeronautics & Space Administration's Mercury space program and the historic 1962 splashdown of the Friendship 7 capsule off the island's cost. The 3,500-square-foot Splashdown! Grand Turk exhibit features amazing replicas unique to the Mercury space program, including a scaled 20-foot-tall Atlas rocket and a full-size, three-dimensional replica of astronaut John Glenn in spacesuit, and, of course, a detailed replica of the Friendship 7 capsule, which splashed into the Atlantic in 1962, a few short miles from the island of Grand Turk. Opened in

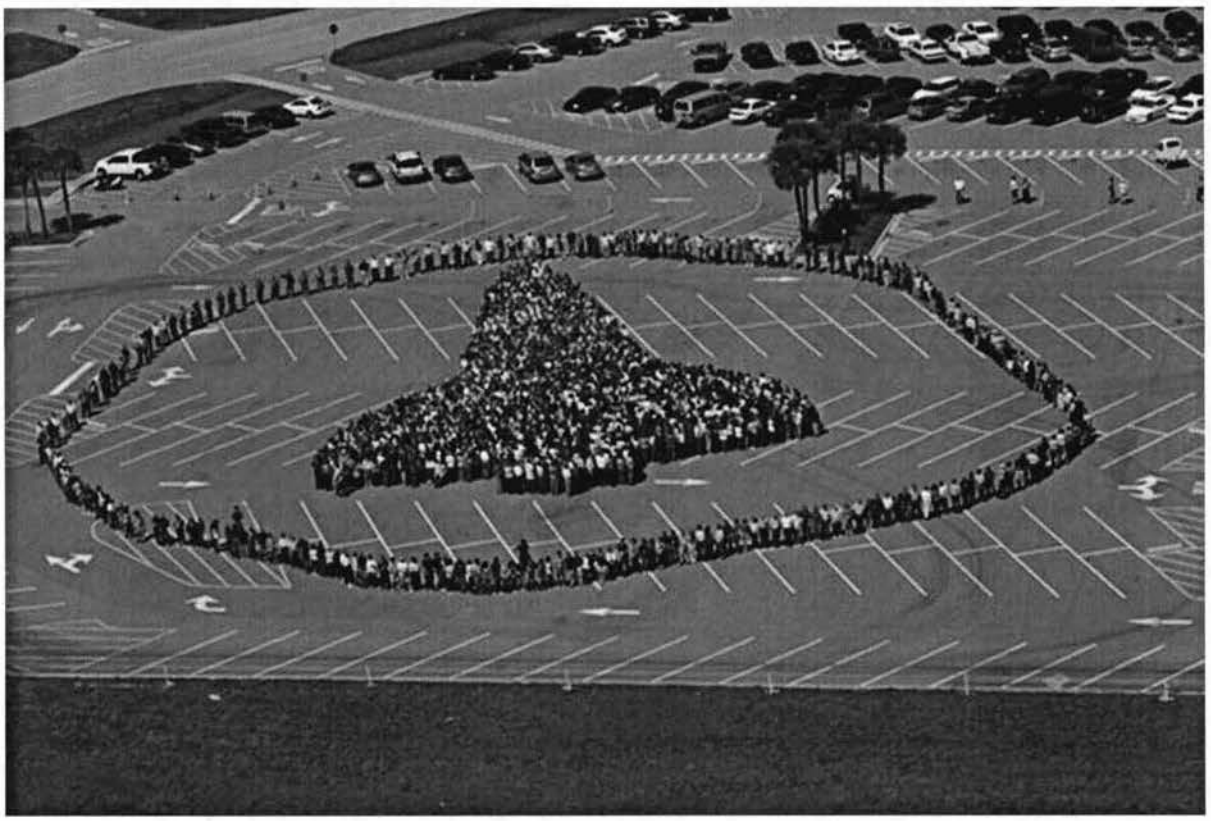
2006, the Grand Turk Cruise Center is operated by Carnival Corporation & plc and hosts nearly 625,000 passengers annually. Web posted. (2011). [New Splashdown! Grand Turk Attraction Earns Top Honors from Porthole Magazine [Online]. Available WWW: http://carnival-news.com/ [2011, March 17].]

**Craft successfully becomes first Mercury orbiter**

After a six-and-a-half-year voyage from Earth, NASA's MESSENGER spacecraft performed a crucial 15-minute rocket firing Thursday evening to brake into orbit around hellish Mercury, becoming the first probe to take up residence around the solar system's innermost world. The burn, which began at 8:54 and concluded at 9:09 p.m. EDT, went according to plan. Web posted. (2011). [Craft successfully becomes first Mercury orbiter [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, March 17].]

**March 18: KSC workers pose for unique portrait**

Thousands of Kennedy Space Center employees stand side-by-side to form a full-scale outline of a space shuttle orbiter outside the Vehicle Assembly Building. The unique photo opportunity was designed to honor the space shuttle program's 30-year legacy and the people who contribute to processing, launching and landing the vehicle. Web posted. (2011). [KSC workers pose for unique portrait [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, March 19].]



**Hazardous Propellant-Loading In Work At KSC**

NASA and contractor engineers are loading toxic rocket propellant aboard Endeavour today as preps for the orbiter's 25th and final flight continue at Kennedy Space Center. The 18-story spaceship and six astronauts are scheduled to blast off from launch pad 39A at 7:48 p.m. April 19. A three-day launch countdown is slated to begin at 6:03 p.m. April 16. Engineers today are loading monomethyl hydrazine and nitrogen textroxide into storage tanks aboard the shuttle. The tanks feed Endeavour's twin orbital maneuvering engines and its 44 nose-and-tail steering jets. The shuttle's three Auxiliary Power Units will be fueled on Saturday. The APUs provide the hydraulic power needed to steer the shuttle's main engines

in flight and operate its aerosurfaces, landing gear, brakes and nosewheel steering system during atmospheric reentry and landing. The hazardous propellant-loading operations will clear the way for the delivery to the pad early next week of the shuttle's primary payload, the Alpha Magnetic Spectrometer. The AMS is a large particle physics experiment package that will be housed outside the International Space Station. It is expected to shed light on dark matter and dark energy in the universe. The Rotating Service Structure at the launch pad will be backed away from Endeavour on Monday in advance of the arrival of the AMS. The payload is to be delivered to the pad and installed in the Payload Changeout Room there on Monday evening. Web posted. (2011). [Hazardous Propellant-Loading In Work At KSC [Online]. Available WWW: http://www.floridatoday.com/ [2011, March 18].]

**Taurus XL Failure Investigation Could Delay TacSat-4 Launch**

The U.S. Defense Department this month shipped an experimental satellite communications payload and its spacecraft platform to the Kodiak Launch Complex in Alaska, where they were mated in preparation for launch as early as May 5, a Navy official said March 14. However, the launch date for the Naval Research Laboratory (NRL)-developed TacSat-4 satellite could be affected by an investigation into the March 4 launch failure of a Taurus XL rocket, said Mike Hurley, head of spacecraft development at NRL. The Minotaur 4 vehicle that will carry TacSat-4 to orbit shares some hardware in common with the Taurus XL; both vehicles are built by Dulles, Va.-based Orbital Sciences Corp. In addition, the military may decide to launch the ORS-1 operational surveillance satellite ahead of TacSat-4 if it is ready in time, the Air Force has said. Although ORS-1 is launching from California's Vandenberg Air Force Base, both launch campaigns share some personnel. Web posted. (2011). [Taurus XL Failure Investigation Could Delay TacSat-4 Launch [Online]. Available WWW: http://www.spacenews.com/ [2011, March 18].]

**Meet NASA's Shuttle Rocket Retrieval Ships**

On Friday, NASA released a fascinating video from one of the lesser-known components of the soon-to-retire shuttle program. Shot by high-definition cameras from the decks of NASA's two solid rocket booster (SRB) retrieval ships, the Liberty Star and Freedom Star, the video shows exactly what it takes to pluck the spent rockets from the Atlantic after launch. The footage depicts the retrieval of shuttle Discovery's boosters just after the launch of STS-133 last month. SRBs are the two booster rockets that detach from the space shuttle as it climbs through the atmosphere. Providing 82 percent of the total lift-off thrust, the pair of SRBs separate from the shuttle's external tank after about 2 minutes, or when the vehicle is approximately 146,000 feet (44 kilometers) in altitude. After climbing higher in the atmosphere (up to about 220,000 feet, or 67 kilometers), the tumbling SRBs start to fall back to Earth. Parachutes are deployed and the spent 45 meter long cylinders splash down into the ocean. This is when Liberty Star and Freedom Star swing into action, approximately 225 kilometers (140 miles) downrange from Kennedy Spaceflight Center. The ships take a diving crew to the floating SRBs, re-float them on their sides and tow them back to dry land. Web posted. (2011). [Meet NASA's Shuttle Rocket Retrieval Ships [Online]. Available WWW: http://news.discovery.com/ [2011, March 19].]

**March 20: STS-135: Atlantis in smooth flow as ET-138 undergoes mods**

Atlantis is continuing to enjoy a smooth processing flow inside her Orbiter Processing Facility (OPF-2) for the late June STS-135 mission, while her External Tank (ET-138) undergoes radius block modifications to avoid the potential of cracks forming in the intertank stringers. Former SSP manager Wayne Hale also noted the observation of such cracks is a classic example of a challenge for what is still an experimental vehicle. Although there are still some political clouds hanging over STS-135 – mainly due to the uncertainty caused by Continuing Resolutions (CR) and the need to complete STS-134 without a large-scale delay which would push Atlantis' mission way past allocated funding cycles – the vital ISS supply run is likely to be staunchly defended by NASA managers. The mission will be the last opportunity to stock up the International Space Station (ISS) via the vastly superior upmass capability of the orbiter, which will be carrying a full Multi-Purpose Logistics Module (MPLM) and a LMC (Lightweight Multi-Purpose Carrier) – also utilizing the downmass ability of the vehicle, which is already

manifested to return the failed Pump Module (PM) for vital examinations on the ground. Atlantis' processing inside OPF-2 continues to show good margin in achieving the end of June launch date, with only 30 Interim Problem Reports (IPRs) charged against the flow, which is now starting to ramp up after a period of Thermal Protection System (TPS) work. Work has also ramped up inside the Vehicle Assembly Building (VAB), where preparations for building up the STS-135 stack are taking place. While MLP-3 (Mobile Launch Platform) is undergoing post launch inspections and repairs, the Solid Rocket Boosters (SRBs – SRB BI-146/RSRM 114) are being processed inside the Rotation Processing and Surge Facility (RPSF). Atlantis tank, ET-138, is currently the center of attention in the VAB's High Bay 2E (HB-2E), as Lockheed Martin engineers from the Michoud Assembly Facility (MAF) began work on installing radius blocks around the LO2 circumference of the intertank flange. Web posted. (2011). [STS-135: Atlantis in smooth flow as ET-138 undergoes mods – Hale on stringers [Online]. Available WWW: http://www.nasaspaceflight.com/ [2011, March 20].]

**Space station payloads readied for Endeavour**

With hazardous fuel loading operations successfully conducted Friday and Saturday on Endeavour for the space shuttle's maneuvering thrusters and engine pods, attention now turns to Monday night's delivery of the mission payloads to launch pad 39A. Hazardous fuel loading operations were conducted Friday and Saturday on space shuttle Endeavour as technicians loaded the orbiter's forward and act reaction control system thruster tanks and the left and right orbital maneuvering system engine pods with storable fuel and oxidizer. The orbiter's auxiliary power units were serviced as well. The launch pad has been reopened for normal work in preparation for retracting the gantry-like rotating service structure on Monday to welcome the mission's payloads. The Alpha Magnetic Spectrometer and Express Logistics Carrier No. 3 were installed into the transportation canister at Kennedy Space Center's Space Station Processing Facility last Tuesday and Wednesday. The can was turned upright and will head for pad 39A on Monday night for hoisting into the payload cleanroom. Web posted. (2011). [Space station payloads readied for Endeavour [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, March 20].]

**March 21: Lockheed Martin shows off test version of Orion spacecraft**

Lockheed Martin Corp. on Monday showed off a test version of the Orion spacecraft, which was initially meant to return humans to the moon but may wind up being an escape vehicle for the International Space Station or taking astronauts beyond Earth orbit. The company also unveiled a cavernous test facility at its Waterton Canyon site south of Denver, where full-size mock-ups of the space station and the front section of the Orion can be used to practice docking maneuvers. NASA is now considering at least two roles for future manned spacecraft, including servicing the space station in low Earth orbit and going on longer, more distant missions. Orion includes a module for crew and cargo, a service module for propulsion, electrical power and other requirements, and a launch-abort system to carry the capsule to safety if the booster rocket fails. NASA successfully tested the launch-abort system two weeks ago at White Sands Missile Range, N.M. Lockheed Martin is NASA's prime contractor for the Orion project. The company said it built the $35 million, 41,000-square-foot test facility, called the Space Operations Simulation Center, at company expense. The first Orion capsule is being assembled in another building at Lockheed Martin's Waterton Canyon site. It will be used for ground testing and could possibly be launched into a suborbital test flight, said James Bray, Lockheed's crew and service module director. Bray said the test results will be used in the engineering of the first Orion capsule to fly in space. Work on that capsule is expected to start in August. The first orbital space flight of an Orion capsule is expected in 2013, said John Karas, vice president and general manager for human space flight for Lockheed Martin Space Systems Co. Web posted. (2011). [Lockheed Martin shows off test version of Orion spacecraft, trial facility near Denver [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, March 21].]

**March 22: Veteran Shuttle Astronauts Selected for 2011 U.S. Astronaut Hall of Fame**

Veteran Space Shuttle Astronauts Selected for 2011 U.S. Astronaut Hall of Fame Induction

Karol J. "Bo" Bobko and Susan J. Helms will join an elite group of American space heroes as they are inducted into the U.S. Astronaut Hall of Fame® during a ceremony at Kennedy Space Center Visitor Complex on Saturday, May 7, 2011. They will be welcomed to the ranks of legendary space pioneers like Neil Armstrong, John Glenn, Alan Shepard, Jim Lovell, Sally Ride and John Young – distinguished members of this unique Hall of Fame. This is the tenth group of space shuttle astronauts named to the U.S. Astronaut Hall of Fame. Earlier inductees represent the Mercury, Gemini, Apollo, Skylab and Apollo-Soyuz programs. The addition of Bobko, a shuttle commander who flew two orbiters' first flights; and Helms, a spacewalker who set a world record outside the International Space Station, will bring the number of space explorers enshrined in the Hall of Fame to 79. The 2011 inductees were selected by a committee of current Hall of Fame astronauts, former NASA officials, historians, and journalists. The process is administered by the Astronaut Scholarship Foundation. To be eligible, an astronaut must have made his or her first flight at least 17 years before the induction year and must be retired at least five years from the NASA astronaut corps. Candidates must be a U.S. citizen, NASA-trained, commander, pilot or mission specialist and must have orbited the earth at least once. Web posted. (2011). [Veteran Space Shuttle Astronauts Selected for 2011 U.S. Astronaut Hall of Fame Induction [Online]. Available WWW: http://hospitality-1st.com/ [2011, March 22].]

**Jamison to Receive Debus Award**

Jerry A. Jamison, vice president of launch operations for United Launch Alliance, has been selected to receive the 2011 Dr. Kurt H. Debus Award by the National Space Club Florida Committee. Jamison will be honored at the Debus Award Dinner April 16 at the Debus Conference Facility at the Kennedy Space Center Visitor Complex. "Jerry has over 27 years of service to our nation's space program including both Air Force and NASA payloads and currently leads over 1,000 Cape and Vandenberg employees," said National Space Club Chair Dr. Stephen Feldman. "His dedication and influence in our space program is exemplary." Named for KSC's first director, the Debus Award recognizes significant achievements and contributions made in Florida to American aerospace efforts. At launch sites at Cape Canaveral Air Force Station in Florida and Vandenberg Air Force Base in California, Jamison is responsible for integrating the launch services for ULA's three launch vehicles: the Atlas V, Delta II and Delta IV and associated product lines. Jamison has led engineering teams in numerous launch systems including both Air Force and NASA payloads. Web posted. (2011). [Jamison to Receive Debus Award [Online]. Available WWW: http://www.floridatoday.com/ [2011, March 22.]

**Another Step Forward for COTS**

NASA's Commercial Orbital Transportation Services (COTS) program took another step forward today with the inauguration of a new facility at NASA's Wallops Island, VA launch facility. Orbital Sciences Corp., based in Dulles, VA, is one of the two companies vying to provide commercial services to NASA for taking cargo to the International Space Station (ISS) as part of the COTS program. While most media attention has been focused on Orbital's COTS competitor SpaceX, Orbital has been moving along with development of its Taurus II launch vehicle which it plans to launch from Wallops. Located off the southern portion of the so-called Delmarva (Delaware-Maryland-Virginia) Penisula along the Atlantic Ocean east of Washington, DC, Wallops has been the site of many suborbital and some orbital launches throughout its long history. A portion of the facility is now called the Mid-Atlantic Regional Spaceport. NASA Administrator Charlie Bolden presided over a ribbon-cutting ceremony at its new Horizontal Integration Facility that will be used for the Taurus II. Bolden referred to the "tough mission schedules" facing COTS as the space shuttle program comes to an end and NASA loses the shuttle's significant cargo-carrying capacity. The first Taurus II launch is expected this fall. Wallops is located in Virginia, but is managed by NASA's Goddard Space Flight Center in Maryland. Web posted. (2011). [Another Step Forward for COTS [Online]. Available WWW: http://www.spacepolicyonline.com/ [2011, March 22.]

**Endeavour payloads to put final touches on space station**

The cosmic experiment headed for the International Space Station to probe the mysteries of physics and more spare parts to keep the outpost flying after the space shuttles are retired have arrived at the pad for launch aboard Endeavour four weeks from today. A special transport canister shaped like the shuttle's 60-foot-long payload bay was hoisted into pad 39A's gantry overnight to unload the mission's critical cargos into the cleanroom. The Alpha Magnetic Spectrometer and the Express Logistics Carrier No. 3, both destined for attachment onto the space station's truss backbone, will be inserted into the shuttle's bay Friday to await the April 19 blastoff. "It's almost like each of the payloads is a separate mission, but the two come together," said Joe Delai, Kennedy Space Center's payload mission manager. Endeavour's diverse passengers represent nearly 30,000 pounds of hardware and are the last additions that the shuttle program will give to the space station's million-pound structure after 12 years of assembly work. The two-sided ELC-3 holds a pair communications antennas, a high-pressure oxygen tank, an extra ammonia coolant reservoir, a new arm for the Dextre robot and some assorted electronics. It is the final batch of large replacement items that NASA has been stockpiling in orbit for future use once the heavy-lifting shuttles go out of service. "The objective is to get all the spares, the larger parts that need to fly on the shuttle, up on the station," said Bob Hart, the Boeing payload flow manager. Using the space station to support AMS was the obvious choice, he says, adding that launching the instrument as a free-flying satellite would be far too costly. The station has the room and the extensive power required. But just getting AMS into space has been a daunting challenge for the multi-national collaboration between 16 countries, 60 institutes and 600 physicists. Originally designed for a three-year temporary stay aboard the station, AMS was supposed to go up and come back on shuttle missions. But after the Columbia accident and the Bush Administration's decision in 2004 to retire the shuttle program by 2010, the remaining flights were devoted to finishing station construction in the least-possible number of launches. AMS fell off the manifest completely. Outrage in scientific circles and the dogged determination by Ting won support in Congress, and NASA was ordered to fly an extra shuttle flight to get AMS delivered to the station. That's STS-134, the 25th and final voyage of Endeavour. However, the planned launching last summer was postponed so AMS could under a major change. Its helium-cooled superconducting magnet designed to last just three years was replaced with a permanent device that would work as long as the space station stays in use. The magnet switch moved Endeavour's flight to this year and breathed an extension into the shuttle program beyond the 2010 retirement deadline. Now, AMS is atop the launch pad and ready to fly. Its mission will unveil a new realm of the universe by detecting and characterizing charged cosmic rays that hit the instrument. Web posted. (2011). [Endeavour payloads to put final touches on space station [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, March 22.]

**March 23: Historic space shuttle pad soon to be scrap**

A launch pad that has been used for shuttles, all three Skylab missions and the Apollo-Soyuz test flight is being dismantled this week, a move being made to clear the way for future larger launch vehicles. A large crane is being used to dismantle Launch Complex 39B one section at a time. Work to remove the Rotating Service Structure at the pad is continuing, too. The structures both were designed to meet the specific needs of the shuttle program. NASA now intends to go with a "clean pad" approach — one in which rockets would arrive at the pad with service structures atop mobile launcher platforms. The idea is to make the pad available to a number of different vehicles. NASA is being directed by Congress to develop a heavy-lift launch vehicle that would be capable of hauling up spaceships and cargo for missions beyond Earth orbit. It's likely the super-sized rocket would be tested and flown from pad 39B. A total of 52 shuttle missions have been launched from the pad, including the 10th and final flight of Challenger in 1986. While shuttle Discovery was retired March 9 after its 39th mission, two other shuttles are scheduled to make their final flights later this year: Endeavour on April 19 and Atlantis on June 28. Web posted. (2011). [Historic space shuttle pad soon to be scrap [Online]. Available WWW: http://www.usatoday.com/ [2011, March 23.]

**March 24: Engineer's fall still being probed, NASA says there were no safety issues**

NASA says there were no safety gear malfunctions in last week's death of a launch pad worker. The engineer fell to his death March 14 from the shuttle launch pad at Florida's Kennedy Space Center. Endeavour was being prepped for an April liftoff. NASA said the worker wasn't wearing a safety harness, nor was he required to be wearing one. Shuttle program manager John Shannon said in Houston on Thursday that no fall-protection devices failed. And he added that there is no evidence of foul play. The investigation continues. United Space Alliance employee James Vanover was killed in the fall. He was 53-year-old and about to be laid off because the shuttle program is ending. Vanover was checking for debris on the pad, nearly 200 feet up, when he fell. Web posted. (2011). [Engineer's fall from launch pad still being probed, NASA says there were no safety gear issues [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, March 24.]

**Atlantis Crew Prepares For Last Shuttle Mission**

At Johnson Space Center, preparations for STS-135 – a 12-day supply mission to the International Space Station and the absolute end of the shuttle program – are unfolding with increasing urgency despite the absence of congressional agreement on a 2011 budget. The mission is slated to lift off from Kennedy Space Center on June 28 at 3:40 p.m. EDT. At the Florida spaceport, Atlantis awaits the April 19 departure of Endeavour's final mission, STS-134, before taking a place at Launch Pad 39A. In Houston, STS-135 commander Chris Ferguson, pilot Doug Hurley, Sandra Magnus and Rex Walheim have transitioned from training for the rescue role they would shoulder if Endeavour sustained damage to her thermal protection system to preparations for a demanding resupply flight. "I think there is still some speculation as to whether we will actually fly this flight," Ferguson said March 23. "But with every passing day, I'm more and more convinced that NASA has the funding put aside and we have the tacit approval of Congress." The flight is included in the 2010 NASA Authorization Act. Ferguson, Hurley and Magnus spoke of the mission plans during a demonstration of their station rendezvous training. NASA has not flown the shuttle with a crew of four since STS-6, a five-day satellite deployment mission in 1983. The basic flight plan has changed considerably since the 2003 Columbia tragedy and now includes time-consuming heat shield inspections on the second and next-to-last mission days. In addition, station missions, which usually include six or seven astronauts, require "all hands" for the manually flown rendezvous and docking on flight day three. Without a shuttle on standby to serve as their rescue vehicle, Ferguson's crew also will be trained more extensively than usual in space station operations. Should Atlantis reach the station but be unable to re-enter the Earth's atmosphere, the shuttle astronauts would rotate back to Earth aboard a succession of Soyuz flights. Walheim would return after three months, Ferguson after six months, Magnus after nine months and Hurley after a year. To help spread the workload, the Atlantis crew will launch 2 hr. earlier in the crew day than usual. The change will give them 8 hr. to prepare on orbit for the heat shield inspection on day two. Web posted. (2011). [Atlantis Crew Prepares For Last Shuttle Mission [Online]. Available WWW: http://www.aviationweek.com/ [2011, March 24.]

**March 25: Local employment outlook better**

Unemployment in Brevard County declined by a full percentage point in February to 11.4, the state Agency for Workforce Innovation reported Friday. The decline, and a year-over-year drop of 0.2 percentage points, had workplace officials feeling "slightly optimistic," said Joan Van Scyoc, communications director at Brevard Workforce. But with 548 layoffs coming from United Space Alliance on April 8, and thousands more at Kennedy Space Center on the way as the shuttle program comes to an end, the county's jobless rate will remain volatile. "Still troubling is the knowledge that the Florida metro area that encompasses Brevard was second in the state lineup for losing the most jobs," Van Scyoc said. "This is likely to continue throughout 2011, lagging behind the state in how quickly we recover from the recession and the loss of aerospace workers from our region." Out of a labor force of 262,984, there were 30,078 unemployed residents in the county last month. And while hiring in Brevard is slow, job growth is improving in Central Florida. Space industry workers should try looking for work in east Orlando, where businesses are expanding, said Noel Tiell, manager at Robert Half International, a

staffing firm. Web posted. (2011). [Local employment outlook better [Online]. Available WWW: http://www.floridatoday.com/ [2011, March 25.]

**OPM helps NASA's aerospace workers find jobs**

The Office of Personnel Management is teaming with NASA to help aerospace workers affected by the end of the 30-year space shuttle program find government jobs. OPM Director John Berry sent a memo to federal chief human capital officers March 24 that requested that they expand their recruitment efforts to include the more than 6,000 soon-to-be-displaced aerospace employees, who have expertise in areas such as IT, engineering and program management. NASA has created a website on which federal agencies can post jobs and find additional information about the skills of the employees looking for new jobs. Details associated with filing positions, such as job posting and on-site interviews at the Kennedy Space Center, will be coordinated between agency hiring officials and the NASA human resources team at the Kennedy Space Center, according to the memo. Berry said in the memo that OPM's support for NASA is part of its "continuing effort to promote federal hiring in areas most adversely affected by current economic conditions." Web posted. (2011). [OPM helps NASA's aerospace workers find jobs [Online]. Available WWW: http://www.fcw.com/ [2011, March 25.]

**March 26: Endeavour's cargo bay loaded for space station run**

Inside launch pad 39A's cleanroom today, technicians completed inserting a $2 billion physics instrument and a pallet of spare parts into the payload bay of shuttle Endeavour for hauling to the International Space Station. The payload installation effort began Friday and was called complete today at 12:40 p.m. EDT with the Alpha Magnetic Spectrometer and Express Logistics Carrier No. 3 locked into the orbiter's cargo hold. ELC 3 is a two-sided deck carrying various replacement hardware for station systems that can be called upon in the future. It has a pair of S-band communications antennas, a high-pressure oxygen tank, an extra ammonia coolant reservoir, a new arm for the Dextre robot and some assorted electronics. Just after hours Endeavour docks to the space station, scheduled to occur April 21 around 5 p.m. EDT, the robotic arms of the shuttle and station will work in tandem to unberth the 14,000-pound ELC from the payload bay and attach it onto the port-side truss. The following day, the 15,250-pound Alpha Magnetic Spectrometer will be hoisted from the rear of Endeavour's payload bay in similar fashion by the robot arms and mounted to the starboard-side truss. That is planned for April 22 around 2 p.m. EDT, given an on-time launch. AMS is the exotic experiment to prove the existence or myth of antimatter, seek out dark matter and probe the origins of the universe. Endeavour is scheduled for launch April 19 at 7:48 p.m. EDT on the two-week mission that also includes four planned spacewalks to perform maintenance on the station. Web posted. (2011). [Endeavour's cargo bay loaded for space station run [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, March 26.]

**March 27: NASA's Space Shuttle Train Is Basically a Giant, Moving Bomb...**

...but it's actually very safe! And yes, NASA has a railroad. It's been around since 1963, actually—so apologies to space nuts who've known about it for a while—but only recently has the agency uploaded an expose to YouTube.com. Seriously, though, this train takes huge, volatile rocket booster segments and fuel from Utah to the Kennedy Space Center on specialized railroad cars, and has been doing so since 1963. It's been upgraded since then, of course, but the goal remains the same: Take those boosters and fuel from where they're processed, refitted, fixed and manufactured, and get them to the launch pad in Florida. Sadly, the last rocket load was moved in May 2010, in preparation for the final space shuttle flights (beginning with Discovery earlier this month). That said, the railroad will continue to serve NASA in other ways, officials say in the video, which we hope to mean future manned and un-manned space missions. Web posted. (2011). [NASA's Space Shuttle Train Is Basically a Giant, Moving Bomb... [Online]. Available WWW: http://www.gizmodo.com/ [2011, March 27.]

**March 28: SAIC deal with NASA may be worth $1.3 billion**

McLean-based SAIC Inc. has won an information technology contract with the National Aeronautics and Space Administration that could be worth as much as $1.3 billion. SAIC said the NASA Integrated Communications Services contract would provide managerial and technical expertise for the entire space agency, including corporate and mission enterprise services, center and associated component facility services, infrastructure projects and contract management services. The award is part of an IT upgrade project at NASA. It has a three-year base period, valued at $340 million. At NASA's discretion it may exercise up to three options covering an additional eight years. The maximum value of the contract is $1.3 billion. Web posted. (2011). [SAIC deal with NASA may be worth $1.3 billion [Online]. Available WWW: http://www.buzjournals.com/ [2011, March 28.]

**Endeavour Crew Flies to KSC this Week**

The crew for the 25th and final flight of shuttle Endeavour will fly to Kennedy Space Center for a practice countdown this week as NASA gears up for a planned April 19 launch of an International Space Station outfitting mission. Endeavour mission commander Mark Kelly and his crew will arrive at KSC at 7 p.m. Tuesday and then take part in their Terminal Countdown Demonstration Test, or TCDT. The six astronauts will participate in emergency training at launch pad 39A and a two-day practice countdown. The crew will hold an informal Q & A with reporters at the pad Thursday. On Friday, the astronauts will don launch-and-entry suits and climb aboard Endeavour at the pad Friday for the final hours of a launch day dress rehearsal. The crew includes pilot Gregory "Box" Johnson and four mission specialists: Gregory Chamitoff, Andrew Fuestel, Michael Fincke and Roberto Vittori of the European Space Agency. At the pad today, engineers and technicians will hook up a sliding extension platform that allows the midsection of the orbiter to be serviced. The Orbiter Midbody Umbilical Unit attaches to the left side of the spaceship so liquid hydrogen and liquid oxygen can be loaded into the shuttle's fuel cell system. The chemical reactants are combined to generate electricity to power all spaceship systems. Nitrogen and helium gas lines also cross the service platform so fuel cell tanks can be pressurized. The platform is 22 feet long, 13 feet wide and 20 feet high. It extends from the Rotating Service Structure at levels ranging from 158 feet to 176 feet above the pad surface. Aft engine compartment closeouts will pick up today, too. Launch is set for 7:48 p.m. April 19. A three-day countdown is slated to begin around 6 p.m. April 16. Web posted. (2011). [Endeavour Crew Flies to KSC this Week [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, March 28.]

**Decommissioning work starts for shuttle Discovery**

Technicians at the Kennedy Space Center have begun taking apart the shuttle Discovery, the ship now a laboratory specimen for engineering forensics before her future date with a museum. Inside orbiter hangar No. 2 last week, the shuttle's nose piece containing the control thrusters used to maneuver the spacecraft was removed and taken to the hypergolic maintenance facility for decommissioning. It's the first visible sign of critical post-flight safing work now underway on the three-decade-old Discovery as she goes into retirement. The 39th and final space voyage for Discovery launched February 24 to the International Space Station, delivering the Permanent Multipurpose Module to serve as a float-in storage closet and the Express Logistics Carrier No. 4 for holding large spare parts at the orbiting complex. The shuttle flew back to the Florida spaceport for landing March 9. The so-called "transition and retirement" phase for Discovery should last several months, eventually getting the shuttle into a safe state for public display. Schedules say the orbiter will be ready to ferry atop a 747 carrier jet to her final home early next year. But between now and then the space shuttle program wants to delve inside the venerable ship and explore engineering questions about hardware that's not been accessible for examination since construction in the early 1980s. "There's some things on the vehicles, especially Discovery, that we haven't looked at since it was built out in California. Things like actuators. It's very invasive to go in. I had some pretty good debates with the ground operations team about the difficulty of going to get some of these things. But from an engineering standpoint, this is a once-in-a-lifetime opportunity to go see how a reusable vehicle actually weathered this many cycles, this many times on orbit, this much time in ground processing," said John Shannon, the shuttle program manager. Discovery's rich history included

39 flights, 148,221,675 miles traveled, 5,830 orbits of Earth and a full year of cumulative time spent in space. Construction began in August 1979 and the spacecraft was rolled out of the Palmdale factory in October 1983. She became NASA's third operational space shuttle with a maiden voyage in August 1984. The information gained by the various pieces and parts removed for laboratory study, Shannon says, far outweighs leaving the shuttles in exact flight configuration for their museum resting places. NASA Administrator Charles Bolden will announce April 12 -- the 30th anniversary of the first shuttle launch -- which museums get Discovery, Endeavour and Atlantis, plus the prototype Enterprise. It's presumed that Discovery's destination is the Smithsonian. The shuttle program plans the same sort of lab testing on parts from sisterships Endeavour and Atlantis after their Another key aspect of the shuttle retirement effort is saving critical hardware for reuse on next-generation vehicles. Removal of Discovery's three main engines and the two orbital maneuvering system (OMS) pods on the ship's tail will occur in the coming weeks, and both sets of engines will be preserved by NASA for possible use on future vehicles instead of going with the shuttle to the museum. "The main engines are an extremely valuable asset and I want to save all of our Block 2 SSMEs that we have. We have a plan to store them in a purged, safe environment along with all the ground systems required to maintain them until we decide what to do with the next program," Shannon said. "I'm also trying to find enough funds and enough parts to build some static engines that we can display with those vehicles as well, so people can see how big and how complex they really are." Web posted. (2011). [Decommissioning work starts for shuttle Discovery [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, March 28.]

**March 29: Orbital Sees First Taurus II Flight In Sept.**

Orbital Sciences Corp. is on track — with "a limited amount of slack" — to fly its new Taurus II launch vehicle in September on a risk-reduction mission. The first flight main stage is on a ship en route from the KB Yuzhnoye factory in Ukraine to the new Horizontal Integration Facility (HIF) here, where it will be mated with its ATK Castor 30A upper stage and Cygnus cargo capsule. "The risk-reduction flight will be September, five-and-a-half or six months from now, depending on how things go," said David W. Thompson, chairman and CEO of the Dulles, Va.-based space-hardware company, during the HIF dedication ceremony March 22. "And that will be followed about three months later by the COTS [Commercial Orbital Transportation System] demonstration mission in mid-December." The Cygnus pressurized cargo module that will carry supplies on the Taurus II to the International Space Station (ISS) is essentially complete at the Thales Alenia Space factory in Turin, Italy, and the Cygnus service module is taking shape at Orbital's satellite fabrication facility in Dulles. "There are plenty of things to work on; no major areas of concern now," Thompson says of the Cygnus. "Several areas still require a lot of work, but the schedule on that looks pretty good right now. We have a limited amount of slack against all of those dates." Ground-facility managers from Orbital and MARS are getting help in building the new pad from NASA experts normally based at Kennedy and Stennis space centers, Langley Research Center, and Marshall and Goddard space flight centers, as well as the NASA range experts here who are making the transition from sounding rocket launches to orbital missions. NASA Administrator Charles Bolden says Kennedy Space Center specialists are helping to develop the vehicle-fueling system, while Langley experts are working on the high-pressure pad systems. Stennis and Marshall will help with the hold-down test, which will see the rocket's two Aerojet AJ-26 liquid oxygen/kerosene engines firing for about 30 sec. "It's a first time for them, so we're sending in people who've done this time and time again," Bolden says. "I think we're going to be okay." Web posted. (2011). [Orbital Sees First Taurus II Flight In Sept. [Online]. Available WWW: http://www.aviationweek.com/ [2011, March 29.]

**Shuttle Discovery embarks on exhibition journey**

Early next year, shuttle Discovery could be parked in a museum looking just as it did after rolling to a stop this month at Kennedy Space Center to conclude its 39th and final mission. Only insiders would know the windows were spares and the main engines replicas, that chunks of internal plumbing had been removed for safety and scores of parts plucked out for preservation. "From all outside appearances to the general public, the shuttle should appear as if it's an intact orbiter," said Robert Pearlman, an expert on

space artifacts and editor of collectSpace.com. "But in actuality, the orbiters will be somewhat a shell of their complete selves." A four-phase process to ready Discovery for public display began as soon as NASA's oldest surviving and most flown shuttle returned to Earth on March 9. The work is expected to take a relatively small team of technicians about nine months, putting Discovery on track to be ferried to the Smithsonian Institution -- the leading candidate to display it -- as soon as January. Endeavour and Atlantis will get the same treatment after their final flights this year, with one spaceship tentatively ready for delivery by next June and the last by October 2012. NASA plans to announce April 12 who wins the right to display the orbiters. Kennedy Space Center Visitor Complex is among more than 20 institutions competing for the privilege -- and the price tag of up to $28.8 million to get the vehicles ready and transported. Web posted. (2011). [Shuttle Discovery embarks on exhibition journey [Online]. Available WWW: http://www.floridatoday.com/ [2011, March 29.]

**Stacking of final shuttle rocket boosters underway**

The last-ever set of space shuttle solid-fuel rockets began taking shape Tuesday evening as technicians started stacking the boosters that will power Atlantis this summer. Inside Kennedy Space Center's cavernous Vehicle Assembly Building, the left-aft segment was hoisted out of the handling crate around 5:30 p.m., slowly maneuvering into high bay No. 1 and then onto the mobile launch platform. The assembly process will take a couple of weeks to complete. When the work is finished, the twin boosters will stand 149 feet tall and 12 feet in diameter. Each motor is packed with 1.1 million pounds of propellant and burns about five tons per second. The rubber-like fuel, poured in like cookie dough and hardened to resemble the texture of a pencil eraser, is a blend of aluminum powder, ammonium perchlorate, HB polymer, iron oxide and an epoxy curing. Built by Alliant Techsystems, the rockets provide 80 percent of the thrust that propel the space shuttle off the ground. A single shuttle solid rocket booster generates up to 3.3 million pounds of thrust during ascent. The external fuel tank is in the Vehicle Assembly Building awaiting its next move. Currently located across the aisle in the high bay No. 2-East checkout cell being readied for flight, the tank will be mated to the solids by month's end. Atlantis is undergoing final testing at the nearby orbiter processing facility for her 33rd voyage. She will be rolled to the VAB for mounting to the tank and boosters in early May. Launch of this final space shuttle mission is targeted for June 28 at 3:40 p.m. EDT to deliver a massive amount of supplies to the International Space Station using the Italian-made Raffaello cargo vessel. Web posted. (2011). [Stacking of final shuttle rocket boosters underway [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, March 29].]

**Endeavour crew arrives at KSC**

Shuttle Endeavour commander Mark Kelly said Tuesday he and his crew are eagerly awaiting their upcoming mission to the International Space Station. "We like coming to see the space shuttle. So it's exciting, especially when you are three weeks away from launch," Kelly told reporters and photographers gathered at Kennedy Space Center's Shuttle Landing Facility for the crew's arrival. The six-man Endeavour crew is here for a final round of drills and training before their scheduled April 19 launch. They arrived in T-38 jets. Noting that the crew has been training for this mission for two years and the payload has been undergoing processing for nine months, Kelly said they are anxious to fly. National news media interest for the mission is unusually heavy, largely because the commander is Kelly, NASA spokesman Allard Beutel said. Kelly is the husband of U.S. Rep. Gabrielle Giffords, D-Ariz., who was shot in the head during a Jan. 8 assassination attempt while she was meeting with constituents at an outdoor event in Tucson. Six people were killed and 13, including Giffords, injured in the attack. Beutel said requests for media credentials for the mission are up about 65 percent, compared with the normal volume of requests three weeks before a launch. Part of it is because this is Endeavour's 25th and final mission, but Beutel said a major factor is Kelly's connection to Giffords. Beutel said he expects some of the major network news anchors and correspondents to be at KSC for the launch, as well as representatives of many media outlets that typically don't cover shuttle launches in person. This will be the 134th shuttle mission. One flight of Atlantis remains, schedule to launch June 28, before the shuttle

program ends. Web posted. (2011). [Endeavour crew arrives at KSC [Online]. Available WWW: http://www.floridatoday.com/ [2011, March 30].]

**March 30: British space companies begin trade mission in Brevard**

The leader of the British space agency said the way to create space jobs in Florida and Britain is cooperation. "Partrnership is absolutely crucial," said CEO UK Space Agency Professor Keith Mason. "The important thing is to make the cake bigger so everybody gets a bigger slice. If you can do that by partnering between Space Florida and the U.K., that's the best way." Mason spoke at a space conference this afternoon in Cocoa Beach. Space Florida began last year reaching out to the British space industry. He led a delegation of British scientists and businessmen who hope to expand the space industries of both countries. "The U.K. government recognizes that space is one of the growth areas," Mason said. The United Kingdom consists of England, Northern Ireland, Scotland and Wales. It is home to one of the world's leading manufacturers of small satellites, Surrey Satellite Technology Ltd., which will be represented at today's meeting. Web posted. (2011). [British space companies begin trade mission in Brevard [Online]. Available WWW: http://www.floridatoday.com/ [2011, March 30].]

**NASA to set exploration architecture this summer**

NASA's top human space exploration official told U.S. lawmakers Wednesday the agency expects to settle on a design and schedule for a new heavy-lift rocket and crew capsule by this summer, but experts say it's unlikely the vehicles will meet a mandate to be ready for flight by 2016. Testifying before the House Science, Space and Technology committee, NASA exploration chief Doug Cooke said the space agency still has a few months of work to go before rolling out the details of how the super-booster and spaceship will be built. Officials are designing the Space Launch System and Multi-Purpose Crew Vehicle after the NASA Authorization Act of 2010 directed the agency to develop and fly a heavy-lift rocket by the end of 2016. But an interim report delivered to Congress in January said NASA would be unable to meet the legislative deadline under current budget projections, even if the rocket and capsule used hardware recycled from the retired space shuttle and cancelled Constellation programs. That report was released before the Obama administration unveiled its fiscal year 2012 budget request in February, which cut more than $1 billion from the heavy-lift rocket and crew capsule next year compared to the funding blueprint authorized by Congress last fall. The preliminary findings didn't indicate how long NASA expects the development to take, but Cooke told a House space and aeronautics subcommittee Wednesday the final report should be out this summer. Web posted. (2011). [NASA to set exploration architecture this summer [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, March 31].]

**First engine removed from Discovery**

The lower-left space shuttle main engine was removed from Discovery inside the Kennedy Space Center's orbiter processing facility bay No. 2 on Wednesday, March 30 as part of post-flight deservicing and retirement. Built by Pratt & Whitney Rocketdyne, the cryogenic powerplants are fed with liquid hydrogen and liquid oxygen stored in the external fuel tank to propel the space shuttle throughout its eight-and-a-half minute climb to orbit. The engine being removed in these photographs below is SSME Block 2-2048 in Discovery's engine No. 2 position. The just-completed flight was the 11th launch for this particular engine which initially debuted on STS-95 in 1998 when John Glenn made his historic return to space. Web posted. (2011). [First engine removed from Discovery [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, March 31].]

**March 31: Stormy Weather Stalls Shuttle Crew Training**

Stormy weather is holding up emergency training at Kennedy Space Center's launch pad 39A today, but Endeavour's astronauts remain are track to blast off April 19 on an International Space Station outfitting mission. Endeavour commander Mark Kelly told reporters in an informal Q & A that the crew had been scheduled to take part in emergency training at the pad 39A gantry. But the weather forced a delay. Two

of the Endeavour astronauts -- mission specialists Michael Fincke and Roberto Vittori of the European Space Agency -- have not flown on a shuttle mission before so they will have to squeeze in emergency escape training at the launch tower when the astronauts return to KSC on April 15 for final launch preparations. In an emergency, astronauts would climb aboard escape baskets on the 195-foot level of the launch tower and whisk down a 1,200 foot slidewire to a bunker on the western edge of the pad area. Astronaut crews practice climbing in and out of the baskets during their Terminal Countdown Demonstration Test -- their last major training exercise at KSC prior to launch. They do not actually ride down the slidewire. Kelly and Johnson completed three dives to the runway in a Shuttle Training Aircraft today. But then had to call it quits because stormy weather was fast approaching. Severe weather sirens blared out at KSC soon thereafter, and there was an unconfirmed report of a funnel cloud near the pad. Lightning strikes have been recorded at the pad. But Endeavour has not sustained any major damage. The six astronauts are scheduled to launch at 7:48 p.m. April 19 on a mission to deliver a $2 billion high-energy particle detector to the station. They also will haul up a spare parts pallet. The mission will be the 134th for the shuttle program, the 36th shuttle trip to the station, and the 25th and final flight of Endeavour. Atlantis will launch on the 135th and final shuttle flight on June 28. Web posted. (2011). [Stormy Weather Stalls Shuttle Crew Training [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, March 30].]

**NASA to check for shuttle damage after hail storm**

NASA crews will perform a full survey of the space shuttle Endeavour on Thursday, a day after high winds and hail battered the launch pad, according to the space agency. "No one was injured and initially no obvious damage was observed. The storm moved through the area quickly," a NASA press release said. Endeavour is scheduled to blast off to the International Space Station on April 19th. The space shuttle's six astronauts are at the Kennedy Space Center for their launch dress rehearsal. NASA says the storm blew in at about 5:20 p.m. Wednesday. Teams will head to the launch pad on Thursday to confirm there was no damage to the orbiter, which is being prepared for its final flight, before heading into retirement. Web posted. (2011). [NASA to check for shuttle damage after hail storm [Online]. Available WWW: http://www.cnn.com/ [2011, March 31].]

**Salt-Seeking Spacecraft Arrives At Launch Site**

An international spacecraft that will take NASA's first space-based measurements of ocean surface salinity has arrived at its launch site at Vandenberg Air Force Base in California. The Aquarius/SAC-D mission will provide scientists with a key missing variable in satellite observations of Earth that links ocean circulation, the global balance of freshwater, and climate. The Aquarius/SAC-D spacecraft left Sáo José dos Campos, Brazil on March 29. Following final tests, the spacecraft will be attached to a Delta II rocket for a June 9 launch. The mission is a collaboration between NASA and Argentina's space agency, Comisión Nacional de Actividades Espaciales (CONAE), with participation from Brazil, Canada, France and Italy. Aquarius, the NASA-built primary instrument on CONAE's SAC-D spacecraft, will map global changes in the concentration of dissolved salt at the ocean surface. Measuring salinity is important to understanding how changes in rainfall, evaporation and the melting or freezing of ice influence ocean circulation and are linked to climate changes. The three-year mission will provide new insights into how variations in ocean surface salinity relate to these fundamental climate processes. Aquarius will greatly enhance the quantity of ocean salinity measurements that have been collected from ships, buoys and floats. Aquarius is a NASA Earth System Science Pathfinder Program mission. The Aquarius instrument was jointly built by JPL and NASA's Goddard Space Flight Center in Greenbelt, Md. NASA's Launch Services Program at the Kennedy Space Center in Florida is managing the launch. JPL will manage Aquarius through the mission's commissioning phase and archive mission data. Goddard will manage the mission's operations phase and process Aquarius science data. ["Salt-Seeking Spacecraft Arrives At Launch Site NASA Instrument Will Measure Ocean Surface Salinity," **NASA News Release #11-094**, March 31, 2011.]

**Second engine removed from Discovery**

Removal of the space shuttle main engines from Discovery continued on Thursday, March 31 when the lower-right powerplant was extracted from the orbiter. The SSME Block 2-2058 is in Discovery's engine No. 3 position. It flew on six shuttle flights starting with STS-116 that went to the International Space Station in 2006. Built by Pratt & Whitney Rocketdyne, the cryogenic powerplants are fed with liquid hydrogen and liquid oxygen stored in the external fuel tank to propel the space shuttle throughout its eight-and-a-half minute climb to orbit. Web posted. (2011). [Second engine removed from Discovery [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, March 31].]

## APRIL

**April 1:** **NASA Facing $548 Million Payment To Cover USA Pension Fund**

The single biggest check NASA expects to write next year will go to United Space Alliance (USA) to cover a half-billion-dollar shortfall in the space shuttle contractor's pension fund. It is not NASA's fault USA's pension fund — held in stocks, bonds and other assets company officials said are worth between $600 million and $700 million — has just a little over half of the money it needs to guarantee retirement pay promised to 11,000 past and current employees. But the U.S. space agency is legally obligated to make up the shortfall, which totaled more than $500 million as of January, because USA operates the shuttle fleet under a cost-reimbursable contract that entitles the company to charge the government for personnel costs, including pay and benefits. The bill is coming due now because the rapidly downsizing USA is closing out its pension plan as it prepares for an uncertain post-shuttle future. Houston-based USA announced in December that it had begun taking steps to terminate its pension plan, a benefit the Boeing-Lockheed Martin joint venture offered its employees until several years ago, when it switched to a less costly 401(k) retirement savings plan for new hires. USA and NASA have been working on a termination plan with the Pension Benefit Guaranty Corp., a federal agency that regulates pensions and steps in to pay benefits when companies fail. NASA has asked Congress for $548 million in 2012 to ensure USA's pension plan is fully funded before the plan's assets are transferred to new trustees that will offer USA retirees a lump sum distribution or annuity. The actual amount of the shortfall — and thus NASA's liability — will continue to fluctuate as the stock market and interest rates rise and fall. NASA Chief Financial Officer Elizabeth Robinson told Space News that even though the agency is legally obligated to "make the USA pension fund whole" upon the termination of the company's longstanding shuttle operations contract, the agency "is happy to do so." For many years, Robinson said, "USA workers have provided critical services for NASA's shuttle program, and they deserve a solid financial footing in retirement." USA, created in 1995 to streamline space shuttle operations, is the only NASA contractor agency officials know of that still has on its books a defined-benefit pension plan, which promises specified monthly retirement income based on an employee's earning history, length of service and age. Most aerospace contractors abandoned pensions years ago in favor of less costly plans, such as the 401(k), where payout is determined by the performance of investments the employee selects. Norm Gookins, USA's vice president of human resources, said NASA's liability for USA's pension dates back to 1996 when the agency consolidated some three dozen space shuttle contracts into one. A large percentage of the 10,000-plus shuttle workers USA absorbed under its cornerstone Space Flight Operations Contract, he said, were already enrolled in pension plans. As the newly created USA rebadged thousands of shuttle workers from Lockheed Martin, Rockwell International and other contractors, "we just brought those [pension] plans into USA with them." A decade later, when USA and NASA were negotiating the Space Program Operations Contract — a four-year, $6.4 billion agreement since extended through the last shuttle flight — the company realized it could not keep offering a pension and be competitive as it sought new business. Gookins said USA froze new enrollments in the plan, which by 2006 was running $200 million to $300 million short, and began discussing with NASA the need to terminate the pension at the conclusion of the shuttle program. Even though both USA and NASA recognized the plan was running a shortfall, NASA did not have the option of paying it down gradually. "The sad part of that is NASA is subject to the [Cost Accounting Standards] and they can't pay more until you're in termination," Capel said. "And then the [Cost Accounting Standards] say NASA is obligated to contribute whatever is necessary to irrevocably settle all plan liabilities." Web posted. (2011). [NASA Facing $548 Million Payment To Cover USA Pension Fund Shortfall [Online]. Available WWW: http://www.spacenews.com/ [2011 April 1].]

**Endeavour finishes rehearsal for liftoff**

After completing a practice launch countdown Friday, six Endeavour astronauts plan to return to Kennedy Space Center within two weeks for the April 19 blastoff of the second-to-last shuttle flight. Inspections

Friday indicated Endeavour was mostly unscathed by strong storms Wednesday and Thursday that produced lightning strikes, high winds, hail and a funnel cloud near launch pad 39A. Minor damage to insulating foam covering the shuttle's 15-story external fuel tank was not expected to delay launch preparations. Top NASA managers will gather Friday at KSC to review readiness for the 134th shuttle mission and to set an official launch date. Flying for the 25th and final time, Endeavour will deliver a cosmic ray detector and spare parts to the International Space Station during a 14-day mission. Liftoff is targeted for 7:48 p.m. April 19. Led by mission commander Mark Kelly, the astronauts on Friday capped off a four-day training visit to KSC with a launch dress rehearsal. Kelly, pilot Greg Johnson and mission specialists Greg Chamitoff, Drew Feustel, Mike Fincke and Roberto Vittori rode the Astrovan to the pad and strapped into their seats aboard Endeavour. About 2 p.m., the simulated countdown was cut short four seconds before clocks reached zero, and the crew proceeded to review emergency escape procedures before heading back to Houston. Web posted. (2011). [Endeavour finishes rehearsal for liftoff [Online]. Available WWW: http://www.floridatoday.com/ [2011April 1].]

**Endeavour crew commends Kelly's dedication, focus despite family crisis**

The commander of Endeavour's 25th and final flight remains sharply focused on NASA's penultimate shuttle mission despite a personal tragedy that played out on a national stage, a crewmate said Thursday. Mark Kelly, the husband of U.S. Rep. Gabrielle Giffords, D-Ariz., took a month off training after his wife was shot in the head and critically wounded during a Jan. 8 assassination attempt in Tucson that killed six people and injured a dozen others. A veteran of three previous shuttle flights, two of which he commanded, Kelly resumed training Feb. 7 and will be ready to launch as scheduled on April 19. Endeavour mission specialist Michael Fincke said Kelly is doing an outstanding job in a "particularly difficult family situation." The crew also includes pilot Gregory "Box" Johnson and three other mission specialists: Greg Chamitoff, Andrew "Drew" Feustel and Roberto Vittori, an Italian astronaut with the European Space Agency. The six astronauts aim to deliver a $2 billion cosmic ray detector to the space station along with a pallet that holds a spare radiator, an ammonia coolant tank, a high-pressure gas tank and extra parts for the station's two-armed Canadian robot, Dextre. The high-energy particle detector, known as the Alpha Magnetic Spectrometer, or AMS, will search for signs of the invisible dark matter that theoretically makes up 85 percent to 90 percent of the universe. Today, the crew will don bright orange launch-and-entry suits and climb aboard Endeavour at Kennedy Space Center's Launch Pad 39A for a launch-day dress rehearsal. The drill is part of the crew's Terminal Countdown Demonstration Test, or TCDT, their last major training exercise at KSC prior to launch. Severe thunderstorms, lightning strikes, heavy rain and hail interrupted training at the launch pad Thursday. A funnel cloud was spotted five miles west of the pad, and two more were sighted at Haulover Canal, a waterway on North Merritt Island that connects Mosquito Lagoon and the Indian River. Initial inspections at the pad uncovered only minor damage to thermal insulation that covers the shuttle's 15-story external tank. More extensive inspections will be performed in the next few days. NASA still has several days of padding in the schedule leading up to a 7:48 p.m. April 19 liftoff. Kelly and his crew are slated to return to KSC on April 15 for final launch preparations, and a three-day countdown will pick up the next day. Kelly said he still hopes his wife will be able to travel to KSC for the launch. Giffords is at a rehabilitation hospital in Houston and is making remarkable progress in her recovery. Web posted. (2011). [Endeavour crew commends Kelly's dedication, focus despite family crisis [Online]. Available WWW: http://www.floridatoday.com/ [2011April 1].]

**Boeing: SLS Rocket Work Needed To Avert Layoffs**

Boeing will be laying off some 800 employees this summer unless NASA immediately agrees to incorporate the company's work on the canceled Ares rocket program into the agency's planned heavy-lift rocket mandated by Congress, the head of Boeing's space exploration division said March 31. In a briefing with reporters, Brewster Shaw said most of the Boeing work force currently assigned to the U.S. space shuttle, plus those who have been working on the now-canceled Ares 1 rocket upper stage, have nowhere to go within the company other than to NASA's new Space Launch System (SLS). Waiting for

NASA to send out and evaluate bid requests for the work as part of a competitive procurement would take months, if not more than a year, Shaw said — too long for Boeing to maintain the staff now working on the shuttle and the expiring Ares 1 contracts. If the last space shuttle is launched in June as planned, Shaw said, Boeing would begin dismissing shuttle workers in July. If these engineers cannot transition into a new NASA heavy-lift launcher program, or find work in NASA's Commercial Crew Development project, "then we will lose that work force," Shaw said. "They will be laid off. If NASA does a competitive procurement, then it is inevitable." However, Boeing could get at least a partial reprieve the week of April 4 when NASA is expected to announce the winners of a second round of Commercial Crew Development contracts worth a combined $270 million, according to one industry source. The company won $18 million in economic stimulus money from NASA last year to continue work on technologies for a seven-person crew capsule it is developing in collaboration with Bigelow Aerospace to launch atop a United Launch Alliance-built Atlas 5 rocket. Web posted. (2011). [Boeing: SLS Rocket Work Needed To Avert Layoffs [Online]. Available WWW: http://www.floridatoday.com/ [2011April 1].]

**Pratt & Whitney pushing for direction on space travel**

The end of the space shuttle program will mean more job cuts at Pratt & Whitney Rocketdyne's operations in northwestern Palm Beach County. Company officials say they're unsure how many workers will be laid off after the final shuttle launch, which is scheduled for June. "There's going to be some reductions this summer, but we haven't finalized that," Jim Maser, president of Pratt & Whitney Rocketdyne, said in an interview today. Pratt & Whitney Rocketdyne has the contract to build and maintain the space shuttle's main engine, and that work is done by Pratt employees in Florida, California and Mississippi. Pratt's Palm Beach County employees work on the shuttle's turbopumps. Web posted. (2011). [Pratt & Whitney pushing for direction on space travel [Online]. Available WWW: http://www.palmbeachpost.com/ [2011 April 1].]

**Space Alliance, Houston contractors extend NASA work**

United Space Alliance LLC, a Houston commercial space contractor, has negotiated six, one-month options with NASA valued at $436.5 million. The cost reimbursement contract provides for the continuation of services to support fly-out of the space shuttle manifest beyond Thursday. Scope of the work includes mission design and planning; software development and integration; astronaut and flight controller training; and space shuttle and International Space Station-related support to the Constellation Program. NASA plans to exercise four, one-month options to support the current shuttle manifest, the company said. United Space Alliance will perform the work at its facilities in Houston, Huntsville, Ala. and NASA's Kennedy Space Center, Fla. Web posted. (2011). [Space Alliance, Houston contractors extend NASA work [Online]. Available WWW: http://www.bizjournals.com/ [2011 April 1].]

**April 2: Eyes on the skies: Eastern Range tracks every launch**

The Eastern Range is a string of radar and telemetry dishes that extends more than 5,000 miles southeast of Brevard County. Over the past 60 years, spanning the rise of the space program itself, the range's technicians and equipment have tracked hundreds of launches from Kennedy Space Center and Cape Canaveral Air Force Station. Unlike other operations, the Eastern Range will remain intact after the shuttle program ends. Computer Services Raytheon, a partnership between Computer Sciences Corp. and Raytheon Technical Services Co. with 500 Brevard employees, manages the range with about a $100 million budget, and its contract runs until 2017. "The flyout of the shuttle program won't have a big impact on most of the work we do because it's the same whether it's a Delta 4, an Atlas 5, a Falcon 9 or a space shuttle," said Michael Maier, CSR vice president and general manager. "We've got some new radars coming on line. We have new communications systems, new weather systems. It's a steady workload going on there." The company expects to perform new tasks for the commercial launch companies that will emerge after the shuttle flies its last mission this summer. Web posted. (2011). [Eyes on the skies: Eastern Range tracks every launch and three women at CSR lead the way [Online]. Available WWW: http://www.floridatoday.com/ [2011 April 2].]

**Close inspections of space shuttle set to begin**

NASA engineers will begin detailed inspections of space shuttle Endeavour Saturday, two days after thunderstorms, hail and a lightning strike near the launch pad caused minor damage to the spacecraft. Teams began an initial launch pad survey Friday, NASA said in a statement. But investigators weren't able to conduct a thorough inspection because the agency was conducting safety training with the six astronauts who are scheduled to fly in the shuttle's final mission later this month. NASA said no obvious problems have been found, but teams will install platforms Saturday morning that will allow them to inspect Endeavour and its external fuel tank more closely. The storm, on Wednesday and Thursday, included a wind gust of 90 miles per hour at launch pad 39A, as well as a lightning strike "inside the pad perimeter," NASA spokesman Allard Beutel said. NASA officials so far know of minor damage to insulation foam at the top of the shuttle's external fuel tank, Beutel said. Endeavour is scheduled to launch on its final mission to the International Space Station on April 19 at 7:48 p.m. ET. Web posted. (2011). [Close inspections of space shuttle set to begin [Online]. Available WWW: http://www.cnn.com/ [2011 April 2].]

**Battle for retired shuttles gets fiery**

With competition fierce to land a retired space shuttle orbiter, the cities and states vying to bring one home have gotten creative. Lobbying strategies range from a humble lapel pin to a videotaped sales pitch by a former president. There are pledges of extravagant buildings and millions of visitors if chosen. NASA Administrator Charles Bolden said he'll announce the winners on April 12, the 30th anniversary of the first shuttle flight. The announcement will end years of jockeying by dozens of competitors, but it's also likely to bring more disappointment than celebration. After all, only three orbiters remain and Discovery is already committed to the Smithsonian Institution's National Air and Space Museum. That leaves Endeavour and Atlantis up for grabs, and 29 museums and institutions -- including Kennedy Space Center Visitor Complex -- in the race to be a shuttle retirement home, each promoting their site with the energy of a carnival barker. "That decision will be fair, sir," Bolden told a lawmaker at a recent congressional hearing. The goal is to house the shuttles where they can be used as educational displays to promote human spaceflight and inspire interest in exploration. Federal law says the shuttles should retire to places "with an historical relationship with either the launch, flight operations or processing" of the spacecraft. That would seem to give the edge to KSC, which launched every shuttle mission and landed half of them, and Johnson Space Center in Texas, where mission control is located. Bolden is expected to be at KSC on April 12 -- the same day he announces his decision -- to celebrate the anniversary of the first flight. He flew four shuttle flights, including one in 1986 with Sen. Bill Nelson, D-Orlando. The importance of making sure the shuttles are accessible to as many Americans as possible has come up again and again -- suggesting geographical diversity will play a role in Bolden's decision. Some sites, such as the KSC Visitor Complex, are touting new buildings as an added selling point. The complex plans a $100 million, 64,000-square-foot exhibit to house an orbiter for 1.5 million annual visitors. The shuttle would be displayed as if in flight, with its payload bay doors open. For those sites not lucky enough to score Endeavour or Atlantis, there may be a consolation prize, of sorts. Enterprise, the shuttle test vehicle currently at the Smithsonian, may be offered up by the museum to make way for Discovery. Web posted. (2011). [Battle for retired shuttles gets fiery [Online]. Available WWW: http://www.floridatoday.com/ [2011 April 2].]

**April 3: NASA Endeavour Shuttle Launch Delayed**

The final blastoff for NASA's Endeavour—commanded by the husband of wounded Rep. Gabrielle Giffords—has been pushed back at least 10 days due to a scheduling glitch, reports Peter J. Boyer. The scheduled April 19 launch of the space shuttle Endeavour is expected to be postponed for at least 10 days, sources close to the project said Sunday. The Endeavour is commanded by veteran astronaut Capt. Mark Kelly, who, while training for the mission, has also been attending to his wife, Congresswoman Gabrielle Giffords, who is recovering in a Houston rehabilitation hospital after an assassination attempt in Tucson

on January 8. Kelly has said that he hopes his wife will be able to attend the launch, from NASA's Kennedy Space Center in Florida. The two-week mission, which will include four space walks and a rendezvous with the International Space Station, is the last for the Endeavour, and the 134th, and penultimate, mission for the space shuttle program. The 18-story spacecraft, which was rolled out to the launch pad last month, is now expected to blast off on April 29, according to the sources. The glitch evidently has to do with a scheduling conflict involving a Russian resupply craft, the Progress, which was to launch a few days after the Endeavour. That craft cannot dock with the International Space Station while the shuttle is there, and NASA had hoped to persuade the Russians to agree to put the Progress—a robotic craft—into a "parking" orbit until the Endeavour had completed its mission. Apparently, agreement could not be reached, and NASA is now looking for a new launch date—likely, April 29—for the Endeavour. The expected delay would not be the first for this mission. The Endeavour was originally scheduled to launch last November, which would have made possible a space first—an orbital meeting of Endeavour commander Kelly with his twin brother, Scott, who was commanding the International Space Station. That novel moment was missed when the Endeavour's launch date was "slipped" to February, and subsequently to April 19. Scott Kelly returned to Earth last month in a Russian Soyuz spacecraft. The Endeavour's payload includes a $1.5 billion Alpha Magnetic Spectrometer, an eight-ton physics experiment designed to probe space for dark matter that may help to explain the origins of the universe. The spectrometer will be transferred to the space station for installation. Web posted. (2011). [NASA Endeavour Shuttle Launch Delayed [Online]. Available WWW: http://www.thedailybeast.com/ [2011 April 3].]

**Canceled NASA rocket resurfaces in private bid for tax dollars**

Over the last six years, NASA has paid Alliant Techsystems of Minnesota more than $1 billion to build a rocket capable of taking a half-dozen astronauts to the International Space Station as a first step to flying them to the moon. But the rocket — dubbed Ares I — never has flown. And last fall, President Barack Obama and Congress agreed to cancel it — along with the entire Constellation moon-rocket program of which it was a part — because its price tag kept rising as its launch date kept slipping. So ATK, as the company is known, has gone to a Plan B: It's repackaging the Ares I to compete as a commercial "space taxi" that could ferry astronauts to the space station. But the company doesn't plan to give NASA a discount. Instead, after taking roughly $1.2 billion for the Ares I, ATK is angling for a piece of roughly $300 million in grant money that NASA wants to use to help spur the commercial development of a space taxi. What's more, it claims it can have the new model ready to fly in 2015 — two years earlier than the Ares I would have been available. When asked about this arrangement, ATK officials did not directly address questions about the tax dollars the company has received to build Ares I. Instead, ATK spokesman George Torres pointed out that ATK isn't the only competitor for the $300 million that has taken government money. An announcement of the winners is expected in early April. Indeed, at least two other rivals in the competition have taken federal dollars. SpaceX of California has received nearly a half-billion dollars from NASA to help develop and build the Falcon 9 rocket and Dragon capsule that it launched into space last year. And United Launch Alliance, a partnership between Boeing and Lockheed Martin, has a longstanding contract with the Defense Department worth billions of dollars to launch payloads into orbit, a program also beset by cost overruns. But NASA Administrator Charlie Bolden said he had little concern that ATK was using its failed Ares I effort to help it compete for commercial dollars. "We want to help facilitate a vibrant space economy," Bolden said. "If somebody wants to take the shuttle and re-fly it. I don't care. I just want to make sure the nation has the capability of getting to low-Earth orbit." There's also the issue of ATK claiming the latest version of the Ares I rocket, dubbed Liberty, could meet a 2015 deadline. A presidential commission in 2009 said the rocket suffered from so many problems that it would not be ready until 2017 at the earliest. ATK, however, said the Liberty won't rely on other U.S. aerospace companies to build its upper stage — which they blame for the delays. Instead, ATK is partnering with Astrium, the European company behind the Ariane 5 rocket, to build the upper stage. Web posted. (2011). [Canceled NASA rocket resurfaces in private bid for tax dollars [Online]. Available WWW: http://www.orlandosentinel.com/ [2011 April 3].]

**NASA teams recommend Early Release of Shuttle OPF-3**

With Discovery safely back on the ground after becoming the first orbiter to successfully complete all of the missions assigned to her, NASA is beginning the process of shutting down processing operations in Florida. Specifically, NASA and the Space Shuttle Program are preparing to release Orbiter Processing Facility bay 3 from service earlier than anticipated, thereby eliminating one of three OPFs capable of handling orbiter T&R (Transition and Retirement) processing. While information on where the three iconic space vehicles will be displayed for posterity following the completion of the SSP will not be announced until April 12 (the 30th anniversary of first Shuttle mission, and the 50th anniversary of the first manned spaceflight), NASA is pressing forward with T&R processing in Discovery in Orbiter Processing Facility bay 2 (OPF-2) – a significant change of scenery for Discovery who has called OPF-3 home since 2005. In fact, since Shuttle flight operations resumed in 2005, each orbiter has enjoyed her own OPF: Atlantis in OPF-1, Endeavour in OPF-2, and Discovery in OPF-3 – a rarity in the life of the program which, for a majority of its existence, operated with more orbiter than OPF. However, put simply, all three OPFs are no longer necessary to support Shuttle operations, and with other potential customers expressing interest in using Shuttle hardware for variant vehicles (namely – though not confirmed – the US Air Force's X-37B), NASA is moving toward an early release of OPF-3 – with handling of T&R processing of the Discovery, Atlantis, and Endeavour in only two OPFs. Additional concurrences for inclusion in the Space Shuttle Management Resource Transition (SMRT) document focused on a release of the Processing Control Center (PCC) by December 2011 and of the Space Shuttle Main Engine Processing Facility (SSMEPF) by May 1, 2012. In all, OPF-3 is located just to the northeast of conjoined OPFs 1 & 2 and shares a facility space with the SSMEPF, PCC, Communications & Tracking Station #2 (C&T 2), and the communications hub for part of the Launch Complex 39 area. Web posted. (2011). [NASA teams recommend Early Release of Shuttle OPF-3 [Online]. Available WWW: http://www.nasaspaceflight.com/ [2011 April 3].]

**April 4:** **Spiders in space**

Students and educators will soon be studying spiders in space. Astronauts aboard the upcoming Space Shuttle Endeavor mission will bring spiders to the International Space Station for some hands-on science experiments. Later this month, NASA's STS-134 crew will help select two of the healthiest, most active spiders to bring with them on their mission. "There are fruit flies in a separate chamber and periodically, fruit flies will be released into the spider chamber and they will get caught in the web and the spiders will dine on those," said Gregory Vogt, project manager at the Baylor School of Medicine's Center for Educational Outreach in Houston. The spiders will be part of a biology experiment involving students and educators on Earth. The Baylor College of Medicine is partnering with the space agency to provide an online curriculum guide for the project. The type of spiders used in space will be orb weavers, known for their big, beautiful web patterns and designs. The Endeavor crew will also bring plants to the International Space Station. The Space Shuttle Endeavor's final flight is scheduled for April 19. Vogt said the Spiders in Space experiment will begin the following week. Web posted. (2011). [Spiders in space [Online]. Available WWW: http://www.wvpubcast.org/ [2011 April 4].]

**Rising launch costs could curtail NASA science missions**

Already faced with a potentially flat budget over the next half-decade, scientists and managers overseeing NASA's robotic science probes worry rising and volatile rocket launch prices could further limit the agency's ability to explore the solar system and maintain crucial climate research. Rising launch costs could claim a larger slice of a mission's budget, increasing the price of projects geared for planetary science, astrophysics and Earth observations, according to senior NASA officials. With the federal government's spotlight on spending cuts, it isn't likely NASA will get a budget boost to offset the launch costs, which experts say are triggered by inefficient rocket buying practices, an eroding commercial market, and uncertainty about the future of the space program. That leaves NASA with just one option: fly fewer missions. NASA uses a fleet of launch vehicles to deploy satellites. The agency often selects the

United Launch Alliance Atlas 5 booster to launch solar system missions and large climate research spacecraft. But the Atlas 5 is overkill for many small and medium-class NASA spacecraft, unnecessarily raising the overall cost of missions. The phasing out of the smaller and less expensive Delta 2 rocket leaves NASA with no other proven launch vehicles for those probes. The last Atlas launcher chosen by NASA was for the MAVEN mission to Mars scheduled to lift off in November 2013. The $187 million contract was announced in October and provides for launch on an Atlas 5-401 booster, the rocket's most basic configuration with no solid rocket boosters, a 4-meter payload fairing and a single-engine Centaur upper stage. Three years before NASA announced the MAVEN launch contract, the space agency signed a deal to lift the next Landsat remote sensing satellite on the same version of the Atlas 5 rocket for $124 million. Lynn Cline, deputy associate administrator for NASA's space operations mission directorate, told an agency advisory panel last month the cost of the Atlas 5-401 is expected to rise by 17 percent over MAVEN's $187 million contract value for launches in 2016 and 30 percent for missions in 2018. The skyrocketing launch costs are part of the NASA Launch Services contract signed last year. The NLS agreement with four companies, which follows up a similar expiring contract, covers rocket flight opportunities for NASA spacecraft over the next 10 years. The NASA Launch Services contract includes the Atlas 5 rocket from ULA, Falcon launchers from SpaceX, the Orbital Sciences Corp. Pegasus XL and Taurus XL boosters, and the Athena rocket family from Lockheed Martin. ULA could also return the Delta 2 rocket to the NASA market by adding it to the new NLS contract, which did not initially include the venerable Delta 2, Cline said. NASA has balked at purchasing any of the five remaining unsold Delta 2 rockets because the agency would have to assume high overhead and support costs for continuing the program, which is now due to retire by the end of 2011. The U.S. Air Force has moved its launches to the larger Atlas 5 and Delta 4 rockets. Web posted. (2011). [Rising launch costs could curtail NASA science missions [Online]. Available WWW: http://www.spaceflightnow.com/ [2011 April 4].]

**Ocean Salinity Satellite Arrives in Calif. from Brazil**

Aquarius/SAC-D, an international spacecraft that will measure ocean surface salinity, arrived March 31 at Vandenberg Air Force Base in California in preparation for a June 9 launch aboard a United Launch Alliance Delta 2 rocket. The spacecraft, which left São José dos Campos, Brazil, March 28, is a collaboration between NASA and Argentina's Conae space agency. Other participants include Brazil, Canada, France and Italy. Aquarius, the NASA-built primary instrument on Argentina's SAC-D satellite, will map global changes in the concentration of dissolved salt at the ocean surface. The measurements will help scientists understand how changes in rainfall, evaporation and the melting or freezing of ice influence ocean circulation. The Aquarius instrument, built by NASA's Jet Propulsion Laboratory and Goddard Space Flight Center under the agency's Earth System Science Pathfinder program, will measure ocean surface salinity by sensing thermal microwave emissions from the water's surface with a radiometer. The Aquarius/SAC-D craft will fly in a 656-kilometer high polar orbit where it will map the global ocean once every seven days. Web posted. (2011). [Ocean Salinity Satellite Arrives in Calif. from Brazil [Online]. Available WWW: http://www.spacenews.com/ [2011 April 4].]

**April 5: Florida seen as leading contender for 1 of 3 shuttles**

Kennedy Space Center, site of all space shuttle launches during the program's 30-year history, wants to be a permanent home for display of one of the orbiters. The Kennedy Space Center Visitor Complex, operated by a private company under contract to NASA, has a plan for an eye-catching horizontal display of the shuttle, with payload doors open, appearing to be in flight against a black backdrop. It is envisioned as a highlight attraction at what is already a tourist mecca on Florida's Space Coast and longstanding home to much of the shuttle program's work force. "Why wouldn't we get one? We live and breathe the space program here," Bill Moore, chief operating officer of the visitor complex, said Monday. "It is the Space Coast, after all. People here are very proud of that." The Kennedy Space Center Visitor Complex is among 21 organizations vying for NASA's three orbiters, which will be retired this year. A test shuttle that never flew in space also will become available. The competing organizations include the National Museum of the U.S. Air Force, Smithsonian Institution, Space Center Houston, Chicago's Adler

Planetarium, New York's Intrepid Sea, Air & Space Museum, Seattle's Museum of Flight, and the California Science Center in Los Angeles. NASA is to announce on April 12, the 30th anniversary of the first space shuttle flight, who will receive the orbiters for permanent display. NASA should assign one of the shuttles to the Kennedy site because of its intimate relationship with the space program and its unassailable history as site of all 133 shuttle launches, said Alan M. Lovelace, who was NASA's interim administrator when the space agency launched its first shuttle in 1981. Delaware North Cos., a $2 billion-a-year business that operates the Kennedy visitor center, said it expects to cover NASA's $28.8 million cost for preparation, transport and delivery of a shuttle from company revenues generated by admission, food and retail sales at the visitor center, plus a loan if needed. No taxpayer dollars would be involved, the company said. The company used a similar in-house funding plan to finance prior exhibits, including the Shuttle Launch Experience and the Apollo/Saturn V Center, spokeswoman Andrea Farmer said. Web posted. (2011). [Florida seen as leading contender for 1 of 3 shuttles [Online]. Available WWW: http://www.daytondailynews.com/ [2011 April 5].]

**Boeing Targets Key Space Systems**

As Boeing leads the close-out of NASA's space shuttle operations, it is bidding for work under the second phase of the agency's Commercial Crew Development (CCDev 2) program as well as helping craft the future of U.S. heavy-lift rocket capability. Boeing is seeking CCDev 2 money to accelerate development of its CST-100 crew capsule. "We'd like to bring the capsule to operational utility," says Boeing Network and Space Systems President Roger Krone. The low-cost capsule design incorporates commercial off-the-shelf equipment and is "really only designed to go to low Earth orbit [LEO]. It's not a capsule you'd ever take past Earth orbit, and is focused specifically on [transport to] the International Space Station [ISS]," Krone says. Pad abort tests are scheduled for 2013, with a more demanding ascent abort test in late 2014. The abort system is a pusher device, unlike the tower-mounted "puller" system used on the Lockheed Martin Orion. An un-crewed orbital test flight of the vehicle, which is being developed jointly with Nevada-based Bigelow Aerospace, also is scheduled for the same year, while the first flight test with crew is currently set for early 2015. Whether Boeing's own vehicle will be ferrying crew to orbit or not, the company remains responsible for sustaining engineering for the U.S. segment of the ISS under a contract awarded by NASA in 2010. The $1.24 billion, five-year contract extension includes sustaining engineering for hardware and software on the U.S. element as well as common hardware and software for the international partners. Web posted. (2011). [Boeing Targets Key Space Systems [Online]. Available WWW: http://www.aviationweek.com/ [2011 April 5].]

**SpaceX Announces Launch Date for the World's Most Powerful Rocket**

Today, Elon Musk, CEO and chief rocket designer of Space Exploration Technologies (SpaceX) unveiled the dramatic final specifications and launch date for the Falcon Heavy, the world's largest rocket. "Falcon Heavy will carry more payload to orbit or escape velocity than any vehicle in history, apart from the Saturn V moon rocket, which was decommissioned after the Apollo program. This opens a new world of capability for both government and commercial space missions," Musk told a press conference at the National Press Club in Washington, DC. "Falcon Heavy will arrive at our Vandenberg, California, launch complex by the end of next year, with liftoff to follow soon thereafter. First launch from our Cape Canaveral launch complex is planned for late 2013 or 2014." Musk added that with the ability to carry satellites or interplanetary spacecraft weighing over 53 metric tons or 117,000 pounds to orbit, Falcon Heavy will have more than twice the performance of the Space Shuttle or Delta IV Heavy, the next most powerful vehicle, which is operated by United Launch Alliance, a Boeing-Lockheed Martin joint venture. 53 metric tons is more than the maximum take-off weight of a fully-loaded Boeing 737-200 with 136 passengers. Web posted. (2011). [SpaceX Announces Launch Date for the World's Most Powerful Rocket (with Video) [Online]. Available WWW: http://www.onorbit.com/ [2011 April 5].]

**2011 shutdown threats, 2012 budget planning**

Little, if any, progress was made Tuesday to come up with a deal to fund the federal government for the rest of fiscal year 2011, increasing the chances of a federal government shutdown come Friday night. While there's no sign of a breakthrough that could lead to a deal by the deadline, that deadline could get moved. The House Appropriations Committee has introduced another continuing resolution (CR) which would fund the government for another week, and in addition fund the Defense Department through the rest of the fiscal year. That CR does include $12 billion in budget cuts, including $139 million for NASA: $40 million from its construction account and $99 million from its space operations account, according to the text of the legislation. However, there's no guarantee that this CR would pass both houses of Congress, and President Obama said Tuesday he was opposed to another short-term CR. Web posted. (2011). [2011 shutdown threats, 2012 budget planning [Online]. Available WWW: http://www.spacepolitics.com/ [2011 April 6].]

**No repairs needed on shuttle Endeavour's external tanks**

Engineers at NASA's Kennedy Space Center will continue ground support equipment evaluations at Launch Pad 39A following storms that hit the area late last week. Teams met Tuesday and determined minor damage to space shuttle Endeavour's external fuel tank foam insulation will not need to be repaired. The spacecraft was not damaged. Crews at Kennedy's Launch Pad 39A will continue tests on Endeavour's payload, the Alpha Magnetic Spectrometer-2 (AMS) Wednesday. NASA managers will hold a Flight Readiness Review on Tuesday, April 19, to assess the team's readiness to support launch. An official launch date will be selected at the conclusion of the meeting. Endeavour's STS-134 mission is targeted for launch at 3:47 p.m. EDT on Friday, April 29. Web posted. (2011). [No repairs needed on shuttle Endeavour's external tanks [Online]. Available WWW: http://www.cfnews13.com/ [2011 April 6].]

**April 6: House approves tax incentives for space businesses**

With 7,000 layoffs expected at Kennedy Space Center this summer after the space shuttle is retired, there's growing concern about the future of what used to be known as "America's Spaceport." Today, the Florida House passed HB 873, an attempt by Rep. Steve Crisafulli, R-Merritt Island, to induce more commercial rocket companies to set up on the Space Coast by offering them some tax incentives. But in an acknowledgment of the state's current revenue problems, the incentives won't be available until the years 2015-2017. One is a "fully transferable net operating loss tax credit," which would allow businesses to sell their net operating losses to other Florida companies for cash infusions into their businesses. There's also a non-transferable corporate income tax credit of up to 50 percent for a commercial space-related business. To qualify for either incentive, a business must create or maintain at least 35 jobs and invest a minimum of $15 million in infrastructure development. "Florida is no longer the national leader in space-related incentives. Other states are passing us by, so the Legislature must take action to attract more space businesses," Crisafulli said in a statement. "97 per cent of the space-related market opportunity is located outside of Florida – it is ours to capture, and this bill will help us do just that." Senator Thad Altman, R-Melbourne, has sponsored the Senate companion, SB 1224. Web posted. (2011). [House approves tax incentives for space businesses [Online]. Available WWW: http://www.orlandosentinel.com/ [2011 April 6].]

**April 7: NASA braces for possible government shutdown**

Bracing for a potential government shutdown, NASA managers are assessing shuttle launch processing and putting plans in place to continue near-normal operation of the International Space Station if a workforce furlough is ordered. Work to ready the shuttle Endeavour for launch April 29 on a mission to deliver supplies, spare parts and a $2 billion particle physics experiment to the space station would be curtailed for the duration of a furlough, although a skeleton crew would remain in place to monitor the spacecraft and ensure its safety. But as of Thursday, Endeavour's processing flow included nine days of contingency time and NASA officials said the April 29 launch date likely would not be affected unless a furlough extended beyond April 18 or thereabout. "Launch processing will not be affected by a

government shutdown unless it's lengthy," an agency official said. "We're looking at a line in the sand for day-to-day slip of around April 18. If the furlough is a week or less, we don't anticipate any impact. If it's longer than a week, we're going to have to assess that." A stopgap spending bill expires at midnight Friday. If lawmakers do not agree on compromise funding for the rest of fiscal 2011, or approve another short-term stopgap bill, a federal shutdown will go into effect. If so, flight controllers at the Johnson Space Center in Houston would continue operating the International Space Station in near-normal fashion and NASA's Mission Management Team would participate in an already planned meeting Monday with the agency's international partners. Less critical support staff would be on call but not report to work. Shuttle processing at the Kennedy Space Center would come to a virtual standstill. But thanks to a recent delay, no immediate launch date impact would be expected. Endeavour had been scheduled for launch April 19, but NASA announced April 4 that the 134th shuttle flight would be delayed 10 days because of a conflict with the arrival of a Russian Progress supply ship at the space station. The slip to April 29 gives the space agency more of a cushion than usual to cope with unexpected problems and delays. NASA plans to close out the shuttle program by launching the Atlantis on June 28 on a final space station resupply mission. As with Endeavour, the June launch target likely would not be affected unless a government shutdown extended beyond nine or 10 days. After that, both flights likely would begin facing delays. A furlough would have an immediate impact on NASA's public affairs operation, including plans for in-flight media interviews with the space station crew and agency coverage of celebrations in Russia to mark the 50th anniversary of Yuri Gagarin's April 12, 1961, launch on the first manned space mission. Likewise, a news conference April 12 at the Kennedy Space Center to announce which museums will eventually display NASA's three space shuttles would be put on hold. Web posted. (2011). [NASA braces for possible government shutdown [Online]. Available WWW: http://www.spaceflightnow.com/ [2011 April 7].]

**Last shuttle crew training at KSC**

The four-person crew of the last scheduled shuttle mission is visiting Kennedy Space Center for two days of training ahead of a planned June 28 launch. Mission commander Chris Ferguson, pilot Doug Hurley and mission specialists Sandy Magnus and Rex Walheim will be getting more familiar with spacecraft systems and the payload they'll fly to the International Space Station. The veteran crew will climb inside the cockpit of Atlantis in Orbiter Processing Facility-1 and inspect the Italian-built cargo module Raffaello in the Space Station Processing Facility. The standard pre-flight training is called the Crew Equipment Interface Test, or CEIT. Atlantis' 12-day mission intends to keep the station stocked for a year with food and other supplies, limiting the impact of any delays in commercial cargo deliveries by SpaceX and Orbital Sciences Corp. The mission also plans to fly a system investigating the potential for robotically refueling spacecraft and to return a failed ammonia pump module to Earth for study. The mission would be the 135th and final shuttle flight. Meanwhile, KSC teams continue to ready Endeavour to launch the 134th mission on April 29. Web posted. (2011). [Last shuttle crew training at KSC [Online]. Available WWW: http://www.floridatoday.com/ [2011 April 7].]

**Follow Juno's high-flying journey to Cape Canaveral**

Ever wonder what it's like to transport delicate billion-dollar space equipment across the country? It takes precision, care and a little heavy-lifting from the Air Force. NASA's Juno spacecraft will fly to Florida on a C-17 Globemaster today to start preparing for launch to Jupiter in August, and Spaceflight Now is going along for the ride. The spacecraft will be trucked along Denver freeways to nearby Buckley Air Force Base, where a C-17 cargo plane awaits to take on Juno and more than 25 engineers and managers for the three-and-a-half hour flight to the space shuttle landing strip at the Kennedy Space Center in Florida. Once in Florida, the craft will be convoyed Friday night to the Astrotech processing facility in Titusville, just outside the KSC gate. Juno is packed inside a tightly-sealed shipping crate designed to keep the spacecraft in pristine condition while traveling on the road and inside the C-17 aircraft. Juno is scheduled to blast off Aug. 5 on an Atlas 5 rocket. It will take five years for the craft to reach Jupiter, where it will investigate the giant planet's atmosphere, intense magnetic field and study its polar regions

for the first time. Juno's three solar wings were shipped to Florida in mid-March via truck, according to Eric Roberts, chief of operations for the mission's assembly, test and launch operations phase. Web posted. (2011). [Follow Juno's high-flying journey to Cape Canaveral [Online]. Available WWW: http://www.spaceflightnow.com/ [2011 April 7].]

**Space: the final beer frontier**

Researchers at Queensland University of Technology's microgravity "drop tower" are testing the first Australian space beer, which will cater to the soon-to-launch space tourism industry. QUT's research facility director, Ted Steinberg, said the microgravity tower simulated the low-gravity level present in space, allowing the companies behind the beer to determine how it would be affected by space travel. The researchers' work in the tower prepared the beer for a world-first taste test aboard a zero-gravity flight from Cape Canaveral in February, during which an astronaut tried six beer samples and approved the taste and drinkability. The jet plane, on a parabolic flight pattern, experienced periods of weightlessness, during which a test astronaut became the first to try the zero-gravity beer. Web posted. (2011). [Space: the final beer frontier [Online]. Available WWW: http://www.smh.com.au/ [2011 April 7].]

**April 8: 535 USA workers report for the last day**

In the fifth layoff since October 2009, some 535 United Space Alliance workers turned in their security badges and picked up their termination paperwork today at the NASA Shuttle Logistics Depot in Cape Canaveral. It leaves 3,303 USA workers at Kennedy Space Center, where two shuttle flights remain. The last flight, scheduled for June 28, will end the 30-year-old space exploration program that has provided long careers to thousands of engineers and technicians. For many, the grieving over lost livelihoods has turned to acceptance and determination to find another job. "They made history," USA spokeswoman Tracy Yates said. "At this point in the process most of the folks have accepted the fact that the shuttle program is ending and have been dealing really well with it." The laid off workers will receive severance, unemployment and assistance looking for another job. Web posted. (2011). [535 USA workers report for the last day [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 April 8].]

**UN declares April 12 as International Day of Human Space Flight**

The UN General Assembly adopted a resolution at a special session on Thursday declaring April 12 the International Day of Human Space Flight. The resolution was initiated by Russia, which celebrates Causmonaut Day on April 12 dedicated to the historic first manned flight to space by Russia's Yury Gagarin in 1961. "Fifty years have passed since that amazing voyage, but the legend of Gagarin's courage and journey to the 'final frontier' continues to be a source of inspiration for space exploration for peoples and nations around the world," Kiyo Akasaka, Under-Secretary-General for Communications and Public Information, was quoted as saying on the UN Website. On April 12, 1961, Gagarin blasted into the cosomos aboard the Vostok-1 spacecraft, orbiting Earth in 108 minutes and landing safely near Smelovka village in the Saratov Region's Ternovsky District. Web posted. (2011). [UN declares April 12 as International Day of Human Space Flight [Online]. Available WWW: http://en.rian.ru/ [2011 April 8].]

**Shutdown plans in place at KSC**

Fewer than 50 NASA employees and an undetermined number of contractors would staff Kennedy Space Center if Congress and the White House fail to reach a budget deal tonight and the federal government shuts down. The KSC Visitor Complex would remain open, but contrary to plans anticipated Thursday, tour buses would not be allowed into the space center for stops at the launch pad 39A observation gantry or the Apollo/Saturn V Center. If government offices are not open by Monday morning, two events planned Tuesday to celebrate the 30th anniversary of the first shuttle launch and announce the shuttles' future display sites will be postponed. NASA had planned a 1 p.m. event for employees at the hangar

where Atlantis is being prepared for the final shuttle mission, followed by a 4 p.m. public event celebrating the shuttle workforce at the Visitor Complex. The announcement of which institutions win the right to display Discovery, Endeavour and Atlantis in retirement was expected at the 1 p.m. event, which was to feature NASA Administrator Charlie Bolden, KSC Director Bob Cabana and Bob Crippen, pilot of the first shuttle mission 30 years ago. But a budget deal would probably have to be announced by Sunday evening for those events to proceed as planned. Shutdown or not, the Visitor Complex on Tuesday will welcome the TLC show "Cake Boss" and baker Buddy Valastro, who will make a special space shuttle-themed cake. Preparations for Endeavour's targeted April 29 launch would cease, but the launch date would not be impacted unless a shutdown lingered into the week of April 18. A meeting to review the flight's readiness and officially set the launch date is currently scheduled April 19. Some previously scheduled hazardous operations will continue this weekend to drain hypergolic propellants from Discovery's orbital engines and thrusters and its Auxiliary Power Units, part of work to deservice the orbiter and ready it for public display. NASA's furlough plan shows 46 government employees would staff KSC full-time or part-time during a shutdown for "protection of life and property," with 267 on call. Overall, fewer than 500 of more than 19,000 NASA civil servants across the country would continue working during a shutdown. Government and contractor employees forced to stay home would not be paid unless they used vacation or leave days. Meanwhile, the four astronauts scheduled to fly Atlantis on the shuttle program's 135th the final mission wrapped up two days of training at KSC and jetted back to Houston around 4 p.m. today. Commander Chris Ferguson (left), pilot Doug Hurley and missions specialists Sandy Magnus and Rex Walheim visited to get more familiar with the payload and equipment they'll use during the 12-day mission targeted to launch June 28. It was the last time a flight crew participated in what is known as the Crew Equipment Interface Test. The four-person crew is expected to return in early June for a final countdown dress rehearsal. Atlantis is scheduled to move from its hangar to the Vehicle Assembly Building for attachment to an external tank and solid rocket boosters on May 12. The final rollout of a shuttle to a launch pad is expected to begin the evening of May 20, with Atlantis arriving at the pad early May 21. Web posted. (2011). [Shutdown plans in place at KSC [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 April 8].]

**Jupiter-bound probe arrives at launch site**

The Air Force C-17 cargo plane carrying the Juno spacecraft touched down at Kennedy Space Center's shuttle runway at 2355 GMT (7:55 p.m. EDT). After taxiing to the tarmac, the military crew opened the huge plane's doors and engineers unloaded Juno from the cargo hold after sunset. The spacecraft was scheduled to be trucked to the Astrotech processing facility in nearby Titusville late Friday night. Juno is scheduled to launch Aug. 5 and reach Jupiter in July 2016. Carrying about 30 people, including the Air Force's five-man crew, the C-17 Globemaster took off from Buckley Air Force Base outside Denver at about 2045 GMT (4:45 p.m. EDT; 2:45 p.m. MDT) on the way to the Shuttle Landing Facility at the Kennedy Space Center in Florida. Juno is boxed up inside a specially-built crate that keeps the spacecraft clean and contamination-free from the time it left its clean room at Lockheed Martin in Denver until it enters the Astrotech processing facility in Titusville, Fla. The box has carried Lockheed Martin spacecraft for more than a decade, beginning with the Cassini mission's propulsion module that launched to Saturn in 1997. The container is tailor-made for the C-17, with the top of the box reaching just inches away from the ceiling of the airplane's spacious pressurized cargo hold. The outer shell of the fuselage is exposed inside, displaying a maze of cables, pipes and even the structure of the plane's wing. Inside the canister, Juno is attached to an analog of the payload attach fitting, the adapter that will connect the craft to the Atlas 5 rocket during launch. All the cargo inside the plane is tied down with chains and tethers to prevent the sensitive flight hardware from moving around in flight. Like clockwork, engineers check on the environment inside the container to make sure Juno is comfortable. The box is connected to a nitrogen purge unit to cleanse the atmosphere inside, so workers also measure the atmosphere in the pressurized cabin to ensure no dangerous nitrogen fumes are leaking. Web posted. (2011). [Jupiter-bound probe arrives at launch site [Online]. Available WWW: http://www.spaceflightnow.com/ [2011 April 8].]

**Giffords staff planning for space shuttle launch**

Aides for Rep. Gabrielle Giffords are preparing for her to travel to Florida to watch her husband's space shuttle launch at the end of the month, although doctors have yet to clear her to go, her office said Friday. Planning has been ongoing for Giffords' "anticipated attendance" of the April 29 launch of the space shuttle Endeavor, which will be commanded by her husband, Capt. Mark Kelly, the congresswoman's office said in a statement. Giffords has not been seen publicly since she was shot in the head in a Jan. 8 mass shooting in Tucson that killed six and wounded 12 others. Endeavor's two-week trip will be the last for that shuttle and the next-to-last shuttle mission. Shuttle Atlantis will close out the 30-year shuttle program this summer. Kelly and five crewmates will deliver a $2 billion physics experiment to the International Space Station, as well as critical spare parts to keep the orbiting outpost running for another decade. Giffords went to Kelly's last launch in 2008, when he commanded the space shuttle Discovery. Web posted. (2011). [Giffords staff planning for space shuttle launch [Online]. Available WWW: http://news.yahoo.com/ [2011 April 8].]

**Launch delayed 2 days**

Plans to launch an Atlas 5 rocket from Vandenberg Air Force Base next week have been delayed two days by a need to replace a questionable part on the space booster. Instead of Tuesday, the team now is shooting for a blastoff from Space Launch Complex-3 East on South Base at 9:24 p.m. Thursday. The United Launch Alliance booster will carry a National Reconnaissance Office spacecraft to orbit for a clandestine mission. The launch window is classified, but the team reportedly must get the rocket off the ground by 11 p.m. ULA representatives said Friday that the postponement would allow technicians to replace an avionics component on the vehicle. Officials earlier said the government shutdown wouldn't interfere with the launch of the national security payload. Vandenberg commanders are making plans to proceed with military members and contractors while identifying what government civilian workers are deemed critical to completing the mission. The West Coast's fourth Atlas 5 rocket will use just one solid-rocket motor strapped to its side. The same configuration was used for the West Coast's first Atlas 5 rocket in 2008. This is the third launch since last fall for the 4th Space Launch Squadron and ULA at Vandenberg, which saw another Atlas 5 rocket fly in September and the first Delta 4-Heavy rocket launch in January. Web posted. (2011). [Launch delayed 2 days [Online]. Available WWW: http://www.lompocrecord.com/ [2011 April 8].]

**STS-134 Soyuz Flyabout Cancelled – Planning switched to STS-135**

Following a meeting between NASA and Russian Space Agency (Roscosmos) managers on Friday, a decision was made to call off the planned Soyuz documentary flyabout of the International Space Station (ISS) and Endeavour during the STS-134/ULF-6 mission, due to concerns with crew impacts in the event that the Soyuz should fail to re-dock with the ISS. Flyabout planning efforts are now shifting to the STS-135/ULF-7 mission. Under original plans, the recently arrived Soyuz TMA-21/26S would have undocked from Mini Research Module-2 (MRM-2) "Poisk", conducted the flyabout, and then re-docked to MRM-2. Should TMA-21 have failed to re-dock to MRM-2, the only option would have been for the crew to return to Earth, since no other Soyuz-compatible docking ports would have been available on the ISS. This would have resulted in a situation where a complete de-crew of the ISS was necessary, due to the impending departure of Soyuz TMA-20/25S. Under a 29th April launch of Space Shuttle Endeavour, the Soyuz TMA-21 flyabout would have occurred on Flight Day-13 (FD-13) of the mission, which would have been 11th May. Should TMA-21 have failed to re-dock on this date, a serious situation would have been placed on the ISS, considering there would only have been five days remaining until the planned departure of Soyuz TMA-20/25S from MRM-1 "Rassvet" on 16th May. The STS-135 Soyuz flyabout would use Soyuz TMA-21, docked at MRM-2, with a similar attitude/trajectory to those planned for STS-133 and STS-134. The use of Soyuz TMA-21 is acceptable for the STS-135 flyabout, as a failure to re-dock will not result in a de-crew situation, since Soyuz TMA-22 would arrive at the ISS before the next Soyuz landing (TMA-02M). However, if TMA-21 failed to re-dock, it would still leave the ISS crew at three people for an extended period of time. The biggest hurdle to the STS-135 Soyuz flyabout will be

squeezing it into the already jam-packed STS-135 mission timeline. Web posted. (2011). [STS-134 Soyuz Flyabout Cancelled – Planning switched to STS-135 [Online]. Available WWW: http://www.nasaspaceflight.com/ [2011 April 9].]

**Budget Deal to Cut $38 Billion Averts Shutdown**

Congressional leaders and President Obama headed off a shutdown of the government with less than two hours to spare Friday night under a tentative budget deal that would cut $38 billion from federal spending this year. After days of tense negotiations and partisan quarrelling, House Republicans came to preliminary terms with the White House and Senate Democrats over financing the government for the next six months, resolving a stubborn impasse that had threatened to disrupt federal operations across the country and around the globe. Speaker John A. Boehner, who had pressed Democrats for cuts sought by members of the conservative new House majority, presented the package of widespread spending reductions and policy provisions and won a positive response from his rank and file shortly before 11 p.m. Both Democrats and Republicans proclaimed they had reached a deal and would begin the necessary steps to pass the bill and send it to Mr. Obama next week. The announcements capped a day of drama as lawmakers and members of the federal work force waited anxiously to see whether money for government agencies would run out at midnight. Lawmakers said they realized that the outcome of the negotiations would have implications not only for them, but also for the federal work force, the public, the economy and the nation's image. Web posted. (2011). [Budget Deal to Cut $38 Billion Averts Shutdown [Online]. Available WWW: http://www.nytimes.com/ [2011 April 8].]

**April 9: Shuttle Work continues After Shutdown Averted**

NASA is plunging ahead with shuttle operations at Kennedy Space Center in the wake of an 11th-hour congressional agreement to keep the federal government running at least through Friday. White House and congressional negotiators are working on a tentative agreement to fund the government through September while cutting $38.5 billion in spending. They also agreed to keep the government running through at least Friday while the details of the deal are being worked out. NASA is contacting civil servants and contractors so they know to report for their next scheduled work days at their normal time as a result. Events being staged to celebrate the 30th anniversary Tuesday of the first shuttle launch are expected to proceed as scheduled. A ceremony outside Orbiter Processing Facility No. 1 is slated for 1 p.m. Tuesday, and there will be a gathering at 4 p.m. at the KSC Visitor Complex. NASA Administration Charlie Bolden is expected to be at KSC to announce where NASA's three shuttle orbiters will be displayed in retirement. A media advisory is expected to be released by NASA Headquarters in Washington no later than Monday morning. The effort to prep Discovery for retirement is continuing this weekend in Orbiter Processing Facility Bay No. 2. Technicians are draining toxic rocket propellants from the shuttle's twin maneuvering engineers, nose-and-tail steering thrusters and auxiliary power units. Launch processing teams will resume preparations for Endeavour's 25th and final flight on Monday. The shuttle and six astronauts are scheduled to launch from pad 39A on April 29. Web posted. (2011). [Shuttle Work continues After Shutdown Averted [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 April 8].]

**April 10: NASA Updates OV-103/Discovery End State Requirements**

One month after the completion of her STS-133 mission, Discovery is nearing completion of Down Mission Processing (DMP) activities inside OPF-2 at the Kennedy Space Center. With DMP nearly complete, technicians will soon begin the initial stages of Transition & Retirement processing on the Shuttle Program's fleet leader. With this step, technicians will follow a revised/updated Delta End State Flow Review for Discovery, as approved by the Program Requirements Control Board. All hardware elements not identified as necessary for SSP manifest flyout will remain installed on Discovery. Should their removal become necessary, however, a plan has been adopted to remove these elements either before rollover to the VAB for storage or after transfer of OV-103 in early June to OPF-1 for complete T&R processing. To accomplish complete protection of OV-103's hardware elements (those not

immediately identified for retention as spares through manifest flyout), Discovery will be hooked up to purge air during all DMP and T&R processing activities. She will even have purge air hook-ups during her one month of storage in VAB HB 4. Furthermore, positive pressure on all vehicles compartments will be maintained during VAB storage. Discovery was originally to be kept in flight-ready condition with only select fluid system de-servicing prior to flyout of the SSP manifest. With confirmation that OV-103/Discovery will be handed to the Smithsonian Air and Space Museum just outside Washington, D.C. expected on Tuesday, April 12 (the 50th anniversary of the first manned spaceflight and the 30th anniversary of the launch of STS-1/Columbia), discussions regarding Discovery's specific Display Site Requirements (DSR) and configuration for the Smithsonian can begin. However, until those discussions are complete, Discovery's T&R team will process OV-103 toward the SSP's agreed upon generic orbiter DSR configuration. Web posted. (2011). [NASA Updates OV-103/Discovery End State Requirements [Online]. Available WWW: http://www.nasaspaceflight.com/ [2011 April 10].]

**April 11: Sources: KSC to get shuttle Atlantis**

NASA chief Charles Bolden is expected to announce that space shuttle Atlantis will be put on permanent display on the Space Coast after its retirement. Several NASA sources, speaking on condition of anonymity, confirmed Monday that Atlantis is headed to the Kennedy Space Center Visitor Complex. Bolden's announcement is scheduled for 1 p.m. in front of the hangar, known as Orbiter Processing Facility-1, where Atlantis is being prepared for the fleet's final flight, targeted for June 28. More than 20 museums and sites around the country have been lobbying to permanently display a shuttle after the program ends this summer. Today's announcement coincides with the 30th anniversary of the first shuttle launch and the 50th of the first human spaceflight by Yuri Gagarin. Discovery is expected to wind up at the Smithsonian Institution National Air and Space Museum facility in Chantilly, Va., just outside Washington, D.C., where a shuttle test vehicle called Enterprise now is displayed. Bolden also will announce where Enterprise, will be relocated. With Atlantis apparently headed to Brevard, that leaves Endeavour up for grabs. Other leading contenders include the Intrepid Sea, Air & Space Museum in New York City; Johnson Space Center in Houston; the National Museum of the U.S. Air Force at Wright-Patterson Air Force Base near Dayton, Ohio; and The Museum of Flight in Seattle. Bolden and KSC Director Bob Cabana also will honor the shuttle work force at the ceremony, which is open to KSC employees. Later today, the Kennedy Space Center Visitor Complex will host a celebration from 3:30 to 7:30 p.m., also marking the 30th anniversary of the space shuttle program. NASA officials and veteran space shuttle astronauts will highlight the accomplishments of the shuttle, as well as the KSC work force, during a public presentation at 4:30 p.m. Buddy Valastro, the baker featured on the TLC show "Cake Boss," will make a special space shuttle-themed cake presentation in honor of this occasion. Web posted. (2011). [Sources: KSC to get shuttle Atlantis [Online]. Available WWW: http://www.floridatoday.com/ [2011 April 11].]

**NASA to Hold 30th Anniversary Ceremony at Kennedy Space Center**

NASA Administrator Charles Bolden will participate in a ceremony at the Kennedy Space Center, Fla., on Tuesday, April 12 on the 30th anniversary of the first space shuttle launch. During the 1 p.m. EDT ceremony, Bolden and Kennedy Center Director Bob Cabana will honor the shuttle work force's dedication, which has made it possible for NASA to take the next steps in exploration and retire the shuttle fleet later this year. During the ceremony, which will feature an astronaut from the first shuttle mission, Bolden also will name the four institutions that will receive a shuttle orbiter for permanent display. The announcement and ceremony will air live on NASA Television and the agency's website. At 3 p.m. on April 12, NASA will hold a media teleconference to discuss the placement of the orbiters. Senior NASA officials will be available to answer questions. The 1 p.m. ceremony is open to Kennedy employees and will take place outside the hangar for shuttle Atlantis, known as Orbiter Processing Facility-1. Atlantis is being prepared for its upcoming STS-135 mission to the International Space Station, the final flight of the Space Shuttle Program. Web posted. (2011). [NASA to Hold 30th Anniversary Ceremony at Kennedy Space Center and Announce Permanent Space Shuttle Locations

[Online]. Available WWW: http://www.spaceref.com/ [2011 April 11].]

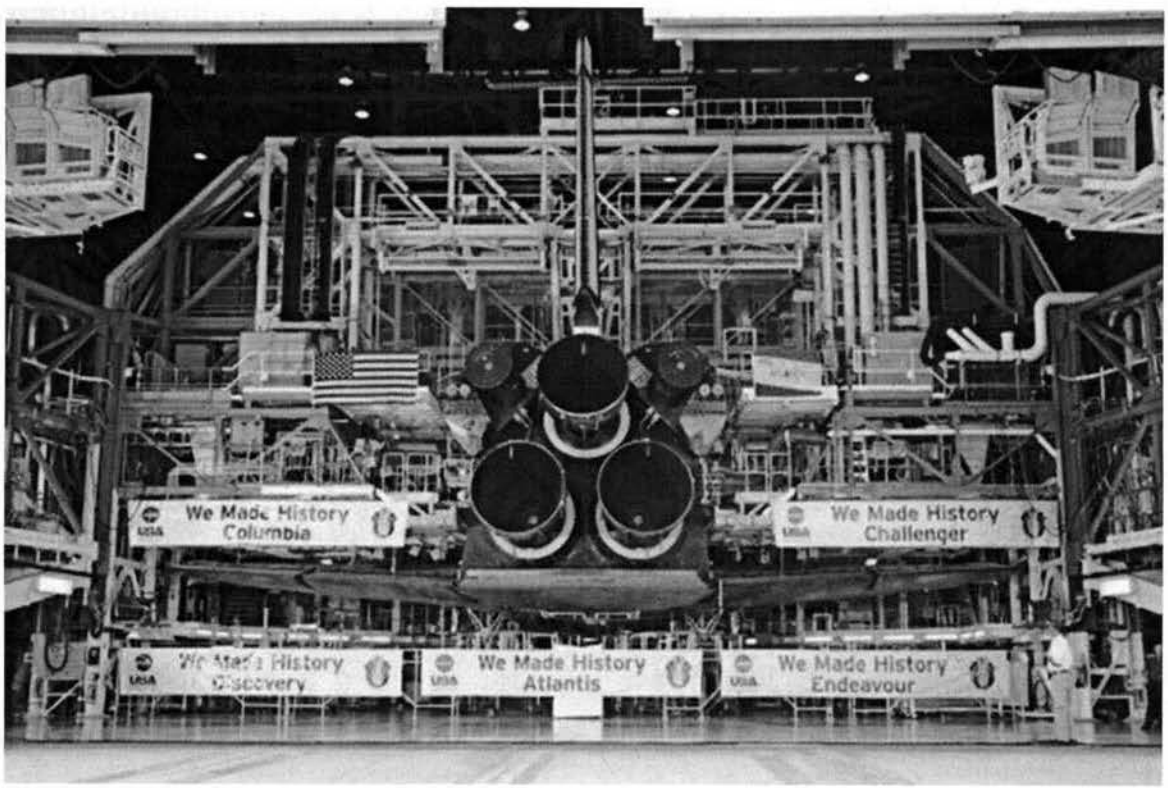
**April 12: Remembering the First flight**

Bob Crippen: Thirty years ago today, I was strapping into a space shuttle bound for space. I had never been to space, and neither had the shuttle. I'd been a member of the astronaut corps since 1969, waiting for the Space Shuttle Program to get off the ground (literally). We'd been told by Deke Slayton when we joined that we wouldn't get to fly until maybe around 1980, but we all thought that, while John Young was a natural choice to command the first flight, he'd probably have someone else who had previously flown with him in the right-hand seat. That didn't stop me from saying 'Absolutely yes!' when they asked me if I'd like to fly with him. I guess they wanted to expand our experience base as quickly as possible, and I was lucky enough to get the first flight. It certainly was a highlight of my life. And I think America was very proud of it at the time, too. The 1970s had been a pretty low point for America. We'd had the Vietnam War, and the assassinations of Martin Luther King Jr. and Robert Kennedy were still strong in our memory. More recently, 52 Americans had spent 444 days as hostages in Iran. And just two weeks before we lifted off, John Hinckley Jr. shot President Reagan. The country was looking for something to be proud of, and I think the shuttle gave them that. It's given America a lot to be proud of over the past 30 years. The International Space Station gets mentioned a lot as an astonishing engineering accomplishment, and a shining example of international cooperation. But the shuttles also revolutionized our knowledge of not only our solar system, but the entire universe, with the satellites we've launched like Ulysses, Magellan and the Hubble Space Telescope. I also personally believe that the classified Department of Defense missions played an important part in the U.S. winning the Cold War. And although the general public may not be making regular trips to space just yet, the space shuttles have opened up space more people than ever before – all different types of people, people with all back grounds. That's quite a resume. I think it will be a long time before we see a vehicle that's nearly as capable as the shuttle, but hopefully we will someday. In the meantime, I think everyone who had a hand in the program can claim a part in the shuttles' many accomplishments. I quite often tell people that the space shuttle is not about hardware and software and components – it's really about people. It was designed and built by the American worker. And every one of them – I don't care where they work – are very proud of what they've done with the shuttle. That comes out every time you talk to anyone associated with the program, whether it was 30 years ago, or just yesterday. Web posted. (2011). [Remembering the First flight [Online]. Available WWW: http://rendezvous.jsc.nasa.gov/blogtext.cfm/ [2011 April 11].]

**Choice to retire Atlantis at KSC brings cheers, elation**

Space Shuttle workers let out a big collective cheer Tuesday, as the giant video screen set up outside a Kennedy Space Center Orbiter Processing Facility displayed the news: Atlantis will be retired to the KSC Visitor Complex. NASA Administrator Charles Bolden came to the Space Coast to reveal his decision on where to send the orbiters after the program ends, making his announcement on the 30th anniversary of the liftoff of the first space shuttle in 1981. But before Bolden could get out the words, the cheers and standing ovation began from the nearly 1,000 shuttle workers gathered in the courtyard outside the building, known as OPF Bay No. 1, where Atlantis is being prepared for the final flight of the shuttle program in late June. "Thank you very much. I think I know what it does for you; you have no idea what that applause did for me," Bolden said, choking up. "It's been a rough day." Tuesday's event was part celebration of the shuttle program's three decades in flight, and part culmination of the intense lobbying efforts by officials of 21 communities seeking one of the retired shuttle orbiters. There was disappointment for all but four of those communities. In addition to keeping Atlantis on the Space Coast, Bolden also announced: * The Smithsonian Institution's National Air and Space Museum Steven F. Udvar-Hazy Center in Chantilly, Va., will become the new home for shuttle Discovery, which retired after completing its 39th mission in March. * The California Science Center in Los Angeles will get Endeavour, which is preparing for its final flight at the end of the month. * The Intrepid Sea, Air & Space Museum in New York will get the test orbiter Enterprise, which never flew in space. Enterprise will move

from the Smithsonian's National Air and Space Museum. KSC Visitor Complex officials expect Atlantis to boost attendance there by 15 percent, or 225,000 people a year. The complex already is Brevard County's most popular paid tourist attraction, drawing 1.5 million people a year. A study by the Economic Development Commission of Florida's Space Coast estimates that the attendance boost will generate $15.6 million in new economic impact, including $8.4 million in gross domestic product, as well as 106 permanent jobs. In addition, the project to build a facility to house the orbiter exhibit will create 326 construction jobs for two years. Delaware North Companies Parks and Resorts, which operates the visitor complex for NASA, plans to spend $100 million on the orbiter project, including acquiring it and constructing at 65,000-square-foot building to display it. No taxpayer money will be used for the project. Construction will begin next year, with the exhibit to open in 2013. The building for Atlantis will be connected to the Shuttle Launch Experience simulator attraction. Tuesday's event was emotional, with many in the audience and Bolden himself choking up at times during the hour-long ceremony. NASA official Olga Dominguez, whose team developed recommendations on the shuttle retirement homes, said factors considered included such things as the overall quality of the facilities, finances, attendance, the location's connection to the shuttle program, the population size in the surrounding area and transportation availability to move the shuttle there. Among the leading contenders shut out of an orbiter were NASA's Johnson Space Center in Houston, as well as the Adler Planetarium in Chicago, the Museum of Flight in Seattle and the National Museum of the U.S. Air Force at Wright-Patterson Air Force Base in Ohio. Web posted. (2011). [Choice to retire Atlantis at KSC brings cheers, elation [Online]. Available WWW: http://www.floridatoday.com/ [2011 April 12].]




**Space shuttle retirement museums announced**

Ending months of suspense, NASA Administrator Charles Bolden Tuesday announced the winners of a national competition to display the agency's three space shuttles after the fleet is retired and decommissioned later this year, choosing sites in Florida, California and, as expected, the Washington, D.C., area. Speaking on the 30th anniversary of the first shuttle flight on April 12, 1981, Bolden said the

shuttle Discovery, NASA's senior orbiter, will be displayed near Washington at the Smithsonian National Air and Space Museum's Steven F. Udvar-Hazy Center. The shuttle Atlantis will remain at the Kennedy Space Center in Florida after a final flight in late June while the Endeavour, awaiting launch April 29 on a space station resupply mission, will be displayed at the California Science Center in Los Angeles. "First, here at the Kennedy Space Center where every shuttle mission and so many other historic human space flights have originated, we'll showcase my old friend, Atlantis," Bolden said, standing on a podium in front of Atlantis' open processing hangar. "Not only will the workers who sent it into space so many times have a chance to still see it, the millions of visitors who come here every year to learn more about space and to be a part of the excitement of exploration will be able to see what is still a great rarity, an actual flown space vehicle. "The California Science Center in Los Angeles, only a few miles from the site of the old Rockwell (International) plant where the shuttle was developed and from where its construction was managed, will be the new home for the shuttle on the launch pad, preparing for its final mission, Endeavour. "The Smithsonian's National Air and Space Museum's Steven F. Udvar-Hazy Center in Virginia, will get Discovery, our most traveled orbiter. And New York City's Intrepid Sea, Air and Space Museum ... will get Enterprise, our prototype orbiter that tested the aerodynamics of the craft before it flew into space." Other shuttle artifacts will be displayed at museums across the country. Shuttle simulators will be displayed at the Adler Planetarium in Chicago, the Evergreen Aviation and Space Museum of McMinnville, Ore., and Texas A&M's Aerospace Engineering Department. The Museum of Flight in Seattle, which bid for one of the space shuttles, will receive a full fuselage shuttle trainer and the National Museum at Wright-Patterson Air Force Base in Ohio, another unsuccessful applicant, will display a crew compartment trainer and nose cap assembly. Flight deck commander and pilot seats will be displayed at the Johnson Space Center in Houston while orbital maneuvering system rocket engines will be sent to the U.S. Space and Rocket Center in Huntsville, Ala., the National Air and Space Museum in Washington and the Evergreen Aviation and Space Museum. In addition, heat shield tiles will be offered to interested schools and universities. "We want to thank all of the locations that expressed an interest in one of these national treasures," Bolden said in a statement. "This was a very difficult decision, but one that was made with the American public in mind. In the end, these choices provide the greatest number of people with the best opportunity to share in the history and accomplishments of NASA's remarkable space shuttle program. These facilities we've chosen have a noteworthy legacy of preserving space artifacts and providing outstanding access to U.S. and international visitors." Sen. Bill Nelson, D-Fla., praised the decision to display Atlantis in Florida, saying "it's only fitting that Kennedy Space Center is the final home of one of these great spaceships, Atlantis," he said. "We all hope that generations of visitors and generations of Americans will enjoy and learn by understanding this magnificent program, America's space exploration program." But the decision was a major disappointment to supporters of the Johnson Space Center in Houston, home of the shuttle mission control center and astronaut training facilities, the National Museum at Wright-Patterson and the other unsuccessful applicants. In a taped message from orbit, space station flight engineer Catherine "Cady" Coleman, told the shuttle work force "we will miss the capabilities and the beauty of the space shuttle. It has been a national icon for innovation and exploration for 30 years. But its legacy and yours lives on with the work we do here on the ISS. The retirement of the shuttle fleet should not be seen as an end. It represents the next step in extending humanity's reach farther into space." Web posted. (2011). [Space shuttle retirement museums announced [Online]. Available WWW: http://www.spaceflightnow.com/ [2011 April 12].]

**Kennedy Space Center Visitor Complex to sport major changes**

The Kennedy Space Center Visitor Complex is planning a massive overhaul during the next decade that will include not only a new building to display the retired shuttle orbiter Atlantis, but also a host of other new attractions. Visitor complex Chief Operating Officer Bill Moore said the site's master plan includes:
* Relocation of the U.S. Astronaut Hall of Fame, which is about 6 miles west of the visitor complex on State Road 405/NASA Parkway, to the main complex site. Both attractions are operated for NASA by Delaware North Companies Parks & Resorts. While the Hall of Fame and its artifacts will move, it is possible that the Astronaut Training Experience and other educational facilities used by school groups

will remain at the current Hall of Fame site. * Construction of an observation tower near the Apollo/Saturn V Center, a popular stop on the visitor complex bus tour. The tower would rise at least 200 feet, or the equivalent height of a 20-story building. From the observation deck, viewers will be able to see the KSC launch pads, the Cape Canaveral Air Force Station launch pads, the Merritt Island National Wildlife Refuge and the beaches along the Atlantic Ocean, Moore said. * Revamping the bus-loading area that is the gateway to the visitor complex bus tour. Moore said he wants to give visitors a more elaborate orientation on what they will see at the tour stops. Current tour stops include the Apollo/Saturn V Center, as well as the Launch Complex 39 Observation Gantry, which also will be upgraded as part of the master plan. * A new entrance area to the visitor complex from State Road 405 that will dramatically showcase the Rocket Garden area where historic rockets are on display. The changes are designed to help the visitor complex -- which draws about 1.5 million visitors a year -- increase attendance, both from new and repeat customers. Last week, work on some of the visitor complex upgrades moved from the conceptual design phase to schematic design, in conjunction with PGAV Destinations, Moore said. That St. Louis-based company has worked on hundreds of attraction projects, including Busch Gardens, the Grand Canyon, the Hoover Dam, Niagara Falls and SeaWorld. There is a full-scale orbiter replica at the Shuttle Explorer exhibit at the Kennedy Space Center Visitor Complex; and an orbiter-like mockup exhibit used for educational purposes at the U.S. Astronaut Hall of Fame complex. Atlantis will be housed in a building that will be built on the site of the current Shuttle Explorer attraction. Visitor complex officials say they are still not sure what will be done with that display. Web posted. (2011). [Kennedy Space Center Visitor Complex to sport major changes [Online]. Available WWW: http://www.floridatoday.com/ [2011 April 12].]

**Canadarm on Space Shuttle Endeavour to be returned to Canada**

The Canadian Space Agency is negotiating for the return of the robotic arm on Space Shuttle Endeavour after its final flight later this month, The Canadian Press has learned. NASA received five Canadarms or so-called remote manipulator units. The space agency says the first arm was developed and manufactured for shuttle use under an original memorandum of understanding with the American space agency. One Canadarm was lost in the Space Shuttle Challenger disaster in January 1986 that killed seven astronauts when it exploded on liftoff. The CSA says since the arm on Endeavour has most of the components from the original arm, it is the one that will be returned to the Canadian Space Agency. Endeavour is scheduled to blast off for the International Space Station on April 29 on its last trip into space. The remaining shuttle Atlantis is set to travel into space on June 28 for its final flight, bringing an end to the American shuttle program. Web posted. (2011). [Canadarm on Space Shuttle Endeavour to be returned to Canada after flight [Online]. Available WWW: http://www.google.com/ [2011 April 12].]

**Westboro Baptist Church members plan to picket at Kennedy Space Center**

Westboro Baptist Church members, fresh off a free-speech victory before the U.S. Supreme Court, announced Monday on their website that they plan to stage demonstrations at Dr. Phillips High School and Kennedy Space Center. The Kansas-based church, known for its vitriolic anti-gay protests, will hold both demonstrations on April 29. They plan to picket the KSC Visitor Complex to send a message to U.S. Rep. Gabrielle Giffords, D-Arizona, who is recovering from a gunshot wound to the head during a gunman's rampage in January. According to the group's website, demonstrators want "to remind this nation that the Lord sent the shooter to Arizona to punish this nation for its sins." Giffords plans to attend the launch of the space shuttle Endeavour April 29 because her husband, Mark Kelly, is commander of the mission. Web posted. (2011). [Westboro Baptist Church members plan to picket at Dr. Phillips High, Kennedy Space Center [Online]. Available WWW: http://www.orlandosentinel.com/ [2011 April 12].]

**California launch of Atlas rocket set for Thursday**

With strong winds in the forecast, weather experts aren't gushing with optimism for an on-time launch of the Atlas 5 rocket Thursday night from Vandenberg Air Force Base in California. Meteorologists are predicting a 70 percent chance that the windy weather will violate the strict launch rules and keep the

booster grounded on the pad. Similar odds are given for the backup launch opportunity available Friday night as well. A secretive payload for the National Reconnaissance Office is riding aboard the rocket to Earth orbit. The NRO operates the country's fleet of spy satellites to support intelligence gathering and security. Liftoff time Thursday night is 9:24 p.m. local from Vandenberg's Space Launch Complex 3. The booster will head southward over the Pacific Ocean on the power of its kerosene-fueled main engine and single strap-on solid motor. A cryogenic Centaur upper stage then injects the cargo into desired orbital perch. Final readiness reviews are planned for Wednesday to give approval to enter into Thursday's countdown operation. Web posted. (2011). [California launch of Atlas rocket set for Thursday [Online]. Available WWW: http://www.spaceflightnow.com/ [2011 April 12].]

**Budget Compromise Includes $18.5 Billion for NASA**

The 2011 budget compromise Congress and the White House reached April 8 to avert a government shutdown includes $18.485 billion for NASA, or about 1.3 percent less than the $18.724 billion the U.S. space agency was given for 2010. Details of the proposal, which includes a $38 billion reduction in non-defense spending, were posted April 12 on the House Appropriations Committee website. Most of the NASA savings were achieved by funding Space Operations -- an account that includes the international space station and soon-to-be-retired space shuttle -- at about $600 million below the 2010 level and denying increases the White House sought for Science, Aeronautics and Education. There's also no funding specified for Space Technology, a roughly $300 million account NASA hopes to boost to $1 billion next year. Exploration is the big winner in the NASA portion of the spending bill Congress intends to enact this week to keep the federal government funded for the remainder of fiscal 2011, which runs through September. The bill, H.R. 1473, carves out $3.8 billion for Exploration, including $1.2 billion for a multipurpose crew vehicle based on NASA's in-development Orion capsule and $1.8 billion for a heavy-lift vehicle "which shall have a lift capability not less than 130 tons and which shall have an upper stage and other core elements developed simultaneously." Exploration was funded at $3.625 billion in 2010, a sum that would rise to $3.7 billion under the agency's spending plan for 2012. H.R. 1473 also frees NASA to formally cancel the Constellation program under which it has been developing the Ares family of rockets and an Orion spacecraft optimized for manned lunar missions. Another policy provision prohibits NASA and the White House Office of Science and Technology Policy from engaging in bilateral activities with China. No budget is specified for NASA's Office of Inspector General. The watchdog office has received $36 million in recent years. Web posted. (2011). [Budget Compromise Includes $18.5 Billion for NASA [Online]. Available WWW: http://www.spacenews.com/ [2011 April 12].]

**Celebrating 30 years: Space shuttle program has sweet history**

Thirty years after Columbia blasted off on the shuttle program's maiden voyage, Kennedy Space Center celebrated the anniversary by saluting the workforce behind it all. Events at the space center and nearby Visitor Complex highlighted the contributions of generations of local shuttle workers and their families as the program nears an end and thousands of Kennedy's contractor employees are losing their jobs. "This is a bittersweet time for me as we bring the shuttle program to a close after three decades of operation," said Bob Crippen, pilot of the first shuttle test flight. "All of that was made possible by you and the thousands of other American workers that have contributed to the program." In a ceremony outside the hangar where Atlantis is being prepared for the final shuttle flight, Crippen recalled sitting next to Columbia commander John Young on April 12, 1981, expecting that the second launch attempt would scrub as the first had two days earlier. "When the count passed one minute, I turned to John and I said, 'I think we might do it,' " he said. "It was a fantastic flight. John and I had trained for every possible contingency that we could think of and, thank goodness, we didn't have to contend with very many." "Some say the space shuttle never met many of the goals and objectives that were set for it," KSC Director Bob Cabana, who flew four shuttle missions, told a crowd at the visitor complex. "But I say it exceeded our expectations, and did what no other vehicle could." The program is haunted by disasters that destroyed two shuttles and killed 14 astronauts. But each time it came back. At the Atlantis hangar ceremony, NASA Administrator

Charlie Bolden, another four-time flyer, repeatedly implored the remaining workforce to "stay focused" through the final two flights, which are targeted to launch April 29 and June 28. He drew cheers from the assembled crowd of employees when he announced Atlantis would retire to the Kennedy Space Center Visitor Complex. Later, an estimated 1,600 shuttle employees and their families and at least 500 outside guests gathered at the visitor complex for a barbecue, a rock-and-roll band and an appearance by the TV show "Cake Boss." Celebrity baker Buddy Valastro of New Jersey led the crown in a countdown to an attempted launch of a shuttle cake several feet tall. After a burst of smoke and flame, a platform holding the cake appeared to remain still -- "main engine shutdown," someone in the crowd remarked -- then inched slightly upward. Patty Stratton, an executive with lead shuttle contractor United Space Alliance, was among those who saluted the workers, now dwindling in number, who have supported so many shuttle missions. "It's been a privilege to be part of the best team ever," she said. "We made history together, doing what others dream, and it really was a great ride." Web posted. (2011). [Celebrating 30 years: Space shuttle program has sweet history [Online]. Available WWW: http://www.floridatoday.com/ [2011 April 13].]

**April 13: Extra day added to Endeavour's final flight**

Mark Kelly and the crew of shuttle Endeavour will stay docked at the International Space Station for an extra day next month to help perform maintenance on the orbiting research complex, NASA announced today. The extra day extends the second-to-last shuttle mission -- the last to be flown by Endeavour -- to a planned 15 days in orbit. Endeavour is targeted to launch at 3:47 p.m. April 29. The six-person shuttle crew would be expected to return to Kennedy Space Center at 9:51 a.m. May 14. On the newly created Flight Day 10, NASA said the crew would perform work on the station's carbon dioxide removal system and assorted other tasks. Discovery's final mission last month was extended two days to take advantage of the extra hands available while the shuttle was docked at the station. The shuttle astronauts helped outfit a newly installed module and pack a departing Japanese cargo spacecraft. Endeavour's mission schedule still has a "plus one" day that could be added to handle any unexpected problems, and two days in case weather delays an on-time landing. After landing, Endeavour will be prepared for display at the California Science Center, NASA Administrator Charlie Bolden announced yesterday in a ceremony at KSC. Web posted. (2011). [Extra day added to Endeavour's final flight [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 April 13].]

**Rear Admiral Steidle Named President Commercial Spaceflight Federation**

The Commercial Spaceflight Federation is pleased to announce that Rear Admiral Craig E. Steidle (U.S. Navy, Ret.) has been named as President, effective May 15. Admiral Steidle was approved for the position by a unanimous vote of the Commercial Spaceflight Federation's board of directors and will serve full-time in this capacity working from the organization's headquarters in downtown Washington, D.C. Admiral Steidle has a long and distinguished track record in aerospace as a former senior NASA official, flag officer, program manager, aerospace engineer, naval aviator and combat veteran, and technology innovator. At NASA, Adm. Steidle served as the first Associate Administrator for Exploration Systems, one of the most senior positions in the agency. Web posted. (2011). [Rear Admiral Craig Steidle Named President of the Commercial Spaceflight Federation [Online]. Available WWW: http://www.spaceref.com/ [2011 April 13].]

**April 14: ULA Atlas V launches with NROL-34 payload**

The United Launch Alliance's Atlas V rocket has performed its twenty-fifth launch, delivering into orbit the classified NROL-34 payload for the US National Reconnaissance Office. The launch took place from Vandenberg Air Force Base in California at 04:24 UTC Friday (21:24 local time Thursday). As is typical for NRO launches, no details of the payload or flight plan for the NROL-34 mission were disclosed. This said, the fact that it is launching from Vandenberg rather than Cape Canaveral ruled out low-inclination trajectories such as geosynchronous orbits. Web posted. (2011). [ULA Atlas V launches with NROL-34 payload [Online]. Available WWW: http://www.nasaspaceflight.com/ [2011 April 14].]

**Former KSC security guard accused of arranging sex**

A former NASA security guard faces charges after detectives said he tried to arrange a sexual tryst with a mother and her teenage daughter over the Internet. However, detectives said Christopher Jonathan Albritton, 31, was not talking to the woman he thought had posted the ad, but rather an investigator with the Citrus County Sheriff's Office. According to the arrest affidavit, Albritton, who is from Cocoa, responded to an ad purporting to be from a mother and a daughter looking for "family fun" on March 14. NASA spokesman Allard Beutel said Albritton once worked as a security guard at the Kennedy Space Center, but has not worked for NASA since 2008. Web posted. (2011). [Former KSC security guard accused of arranging sex with underage girl, mom [Online]. Available WWW: http://www.baynews9.com/ [2011 April 14].]

**U.S. Air Force, NASA and NRO Ink Agreement on Launching with SpaceX**

The three biggest U.S. government satellite-buying agencies have concluded a memorandum of agreement to establish rules permitting startup launch-services provider Space Exploration Technologies (SpaceX) to launch U.S. Air Force and other national security satellites, a U.S. Air Force official said April 14. Air Force under Secretary Erin C. Conaton, in a speech delivered to the National Space Symposium here, said the memorandum, signed by the heads of the Air Force, NASA and the U.S. National Reconnaissance Office (NRO), should be released this summer. The agreement "is designed to ensure a consistent position on opportunities, certification and requirements for potential new entrants to space launch," Conaton said in her speech, which in her absence was read by Richard W. McKinney, Air Force deputy under secretary for space programs. Briefing reporters after the speech, McKinney said the policy will set out hurdles that SpaceX will need to clear before its Falcon 9 Heavy rocket, now in development, is permitted to join the Boeing-Lockheed Martin joint venture, United Launch Alliance (ULA), in placing national security payloads into orbit. SpaceX — Space Exploration Technologies, based in Hawthorne, Calif. — recently signed its first-ever contract with a major commercial satellite whose assets are in geostationary orbit. One U.S. government official agreed that if SpaceX is now allowed to break ULA's monopoly on U.S. government satellite launches as indicated by the memorandum of agreement, it could force ULA's already high prices even higher as it eats into ULA's current market. Web posted. (2011). [U.S. Air Force, NASA and NRO Ink Agreement on Launching with SpaceX [Online]. Available WWW: http://www.spacenews.com/ [2011 April 14].]

**KSC Has Lost Over $500K In Items Since 2008**

A new "lost inventory" list shows Kennedy Space Center sometimes has difficulty keeping track of its most basic equipment. The agency has lost more than $519,000 worth of items since 2008. The list includes a host of smaller items, three handheld radios, nine computers and printers, six digital cameras, and that's only the start. There were also big ticket items, like a $100,000 digital recorder, an $18,000 reflectometer and even a $3,000 golf cart. Some items may have been removed as garbage. Others were lost in a move. "We need to do a better job of keeping track of it, obviously, and we know that," NASA spokesman Allard Beutel. Beutel says the misplaced items amount to just a tiny percentage of KSC's $7 billion inventory, but he also said NASA has worked to better educate employees on their equipment responsibilities and prompt reporting. "The sooner we have something reported missing, the sooner people can help try to hunt it down and find it," Beutel said. NASA officials believe many of the misplaced items are being used by the agency somewhere, just not in the proper, assigned location. They expect many of the items will turn up eventually. Web posted. (2011). [KSC Has Lost Over $500K In Items Since 2008 [Online]. Available WWW: http://www.wftv.com/ [2011 April 14].]

**April 15: USA to shed nearly 2,000 Florida workers after Atlantis flight**

NASA's prime contractor for the space shuttle on Friday released estimates on how many of its workers will lose their jobs once NASA flies its final shuttle mission this summer and the cuts — while not unexpected — certainly are not pretty for employees in Florida, Texas and Alabama. Of the 5,600

remaining employees at United Space Alliance, roughly half — or as many as 2,800 — will get a pink slip following the planned June 28 launch of Atlantis. The cuts add to the nearly 2,900 USA workers who have lost their jobs to date as NASA winds down the 30-year shuttle program. Roughly 2,000 of those so far have come from Florida over five layoffs since October 2009. In Florida, the latest round will mean an additional 1,850 to 1,950 employees will be let go, leaving the KSC area with roughly 1,400 employees, who will decommission the shuttles, help build a new NASA crew capsule or work on a variety of smaller contracts, said USA spokeswoman Tracy Yates. About 35 Alabama employees will lose their jobs and as many 800 workers in Texas, where USA is headquartered, will no longer work with the company. The cuts are planned for late July or early August. "The accomplishments of this team are unmatched in human spaceflight," said Virginia Barnes, USA President and Chief Executive Officer, in a statement. "It will be difficult to say goodbye to such tremendously talented and dedicated teammates, and we are committed to making this transition as smooth as possible for them." Web posted. (2011). [USA to shed nearly 2,000 Florida workers after Atlantis flight [Online]. Available WWW: http://www.orlandosentinel.com/ [2011 April 15].]

**Minotaur launch schedule in limbo after Taurus mishap**

Two small U.S. military satellites are queued up and waiting to ride into space on Minotaur rockets in May, but managers want to make sure the boosters are immune from the glitch that doomed the launch of a NASA science mission in March. NASA and Orbital Sciences Corp. are investigating the cause of the March 4 failure of a Taurus XL rocket that destroyed the $424 million Glory mission, a NASA climate research satellite designed to study the atmosphere and the sun's relationship with Earth. The clamshell-like nose cone responsible for the March 4 Taurus mishap uses similar components as the Minotaur 1 and Minotaur 4 launch vehicles being prepared for a pair of flights in May. A Minotaur 4 rocket is being prepared for liftoff as soon as May 14 from Kodiak, Alaska. Its payload will be the Naval Research Laboratory's TacSat 4 experimental communications satellite. Workers at Wallops Island, Va., have already stacked a smaller Minotaur 1 rocket on the launch pad. Liftoff from Virginia's Eastern Shore is scheduled for no earlier than May 30 with the U.S. military's ORS 1 spacecraft, a tactical Earth observation satellite for the Pentagon's Operationally Responsive Space office. TacSat 4 is already at its Alaska launch site, and ORS 1 is awaiting shipment to Virginia. Orbital Sciences is the prime contractor for the Taurus and Minotaur rocket families. Web posted. (2011). [Minotaur launch schedule in limbo after Taurus mishap [Online]. Available WWW: http://www.spaceflightnow.com/ [2011 April 15].]

**Last shuttle boosters completed at KSC**

Another shuttle program "last" enters the record books today at Kennedy Space Center as technicians stack the last solid rocket booster segment for the last shuttle flight. The pointy piece of the right booster, called the right forward assembly (shown at left in this picture), will be lifted into place inside the Vehicle Assembly Building. Two 140-foot-tall boosters, each weighing 1.3 million pounds, will help Atlantis blast off on the final shuttle mission, which is tentatively targeted for launch June 28. An external tank is scheduled to be connected to the boosters April 25, and Atlantis will follow after a planned May 12 move from its hangar to the assembly building. The fully assembled shuttle is expected to roll out to launch pad 39A on the evening of May 20. While the last shuttle boosters are being completed, even bigger boosters could one day be stacked at the space center. Manufacturer ATK is proposing to use a five-segment booster -- developed for the canceled Ares I rocket -- as a first stage for a commercial crew launcher, and NASA might also use them for a heavy-lift rocket. Web posted. (2011). [Last shuttle boosters completed at KSC [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 April 15].]

**Endeavour mission back to 14 days**

After extending Endeavour's upcoming final flight by a day this week, NASA managers have taken it back. The second-to-last shuttle flight officially has officially returned to a 14-day mission, with options to add up to two days while in space. Depending on progress meeting previously planned objectives, the

mission could be extended to allow the six shuttle astronauts, led by Mark Kelly, to help out with maintenance on the International Space Station. Managers added an extra day Wednesday, but decided to subtract it late Thursday, NASA said. If Endeavour launches as planned at 3:57 p.m. April 29, it would be expected to return to Kennedy Space Center at 9:28 a.m. May 13. Senior NASA executives will meet Tuesday at the space center to review the flight's readiness and set an official launch date. Web posted. (2011). [Endeavour mission back to 14 days [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 April 15].]

**What Will Happen to All the Shuttle Stuff?**

As the space shuttles get ready for their second lives as museum pieces, NASA officials are already sorting through their storage closets, trying to figure out what to do with all the memorabilia that isn't useful anymore. The shuttles themselves will go through a lengthy clean-up process before they're ready for their public debuts. When a shuttle lands, it's covered in hazards: liquid hydrogen and oxygen for fuel, ammonia for coolant, live pyrotechnics for blowing off emergency escape windows. "We have to remove those chemical hazards so that when it's in a museum, the public can walk up to it without risk of things outgassing or dripping," said NASA flow director Stephanie Stilson, who oversaw all the post-flight checkups and pre-flight preparations for *Discovery's* last 11 trips to space and is now getting them ready for retirement. Another piece that will be removed for safety is the Forward Reaction Control System, whose small engines control the shuttle's rotation. The shuttles' noses will be removed, stripped of all their innards, and put back on again. "From the outside you won't be able to tell that anything was done, but inside will be empty," Stilson said. Some parts, including windows and movable parts on the wing, will be removed and tested to see how they held up in the harsh environment of space. "This is the only reusable spacecraft we have. Seeing how it fared in exposure to the space environment is important to us," said Kevin Templin of NASA's Johnson Space Center in Houston, who is in charge of transitioning the shuttles to retirement. "There are certain parts on here that if we didn't have to remove them, we didn't remove them. We now have that chance." Aside from that, "we're trying to keep them as flightlike as possible," Stilson said. "Right now the plan would be to show them as if they had just returned from flight." That means no new paint jobs, although if a heat shield tile falls off, the agency will probably replace it with a replica. But if you want a tile for your own museum or school, you only have to ask. NASA set up a website in October 2009 to clear out their garage. They've screened 24,000 items, promised about 3,000 to schools and museums around the country, and given away about 700. They only charge shipping and handling, which for a tile is $23.40. "The items range from as small as freezedried food packets to objects as large as a simulator," Sherouse said. "There's a lot more available than there are people asking for it." For now, though, it's almost just like another day at the office for the crew taking *Discovery* through its final stages. The end of the shuttle era hasn't set in yet for Stilson. "I really think where it will hit me, and become real for me that this is all coming to an end, will be when we take *Discovery* to the Smithsonian and leave her there," she said. "I'm hoping all three of the display sites will do a good job of conveying not just the technical savvy of these display crafts, but also the heart and soul of the team that took care of them." Web posted. (2011). [What Will Happen to All the Shuttle Stuff? [Online]. Available WWW: http://www.wired.com/ [2011 April 15].]

**Space walker/shuttle commander inducted into U.S. Astronaut Hall of Fame**

NASA's Kennedy Space Center Visitor Complex will host a weekend celebration to honor the induction of the 10th group of space shuttle astronauts into the Astronaut Hall of Fame, an event that will allow the public to participate in a variety of events, including autograph signings with many space heroes. Retired Air Force Colonel Karol J. "Bo" Bobko, USAF retired and Lieutenant General, USAF Susan Helms, will join the ranks of legendary space pioneers, bringing the total number of space explorers enshrined in the Hall of Fame to 79. Saturday, May 7, at 3 p.m., the two inductees will be recognized for their accomplishments and will join more than 20 current Hall of Fame astronauts at the special celebration. The selection committee, consisting of 80 members, included current Hall of Fame astronauts, former NASA officials, nationwide space historians and journalists, selected the 2011 inductees during a process

administered by the national Astronaut Scholarship Foundation. To be eligible, each astronaut must have made his or her first flight at least 17 years prior to the induction year and be a retiree of the NASA astronaut corps for five years, as well as a U.S. citizen and a NASA trained commander, pilot or mission specialist. During the special weekend celebration at KSC, astronaut presentations and autograph signings with Hall of Fame astronauts will be held throughout the day. A special astronaut encounter presentation with STS-1 space shuttle pilot and Hall of Fame member, Bob Crippen, is scheduled for 11 a.m. at the Astronaut Encounter Theater. Web posted. (2011). [Record-setting space walker and shuttle commander to be inducted into U.S. Astronaut Hall of Fame [Online]. Available WWW: http://www.myhometownnews.net/ [2011 April 15].]

**April 17: KCC provides training to NASA firefighters**

The Kennedy Space Center in Florida is the United States' gateway into outer space, and trainers from Battle Creek's Kellogg Community College have been helping keep it safe for three years. This month, Joe Teixeira, the school's Air Rescue Fire Fighter Program coordinator, and ARFF instructor Don Hilyer trained NASA firefighters in aircraft rescue and firefighting operations. This was the third trip to NASA for the program. Utilizing KCC's mobile aircraft fire training simulator, Teixeira and Hilyer create simulated fire situations aboard a prop aircraft and monitor firefighter's techniques in combating the blaze. The simulator is attached to a large truck and hauled to the training site; in addition to NASA, KCC has taken the training program to airports and military bases around the country. Kennedy Space Center, near Titusville, Fla., is a unique combination of both. "They've got a three-mile-long runway," Teixeira said. "It's big enough it can land any aircraft, including the shuttle, obviously."That also means some 100 firefighters stationed at the spaceport's three fire stations come with a lot of United States Air Force and Navy firefighting training. They need it in a place where, according to Hilyer, the exotic jet fuels used in the space shuttle's solid rocket boosters can create a concussive force when ignited, physically pummeling firefighters during shuttle-based training burns. The program will visit NASA twice in 2012, and is planning on training sessions at airports in California, Minnesota, Indiana, New York and other states throughout 2011. Under Federal Aviation Administration regulations, airport firefighters are required to attend one training burn, or hot drill. The Air Force requires two burns per year. Web posted. (2011). [KCC provides training to NASA firefighters [Online]. Available WWW: http://www.battlecreekenquirer.com/ [2011 April 17].]

**April 18: NASA makes CCDev-2 awards**

NASA announced on Monday it was awarding nearly $270 million to four companies to continue work on commercial spacecraft that could be used to ferry astronauts to the International Space Station. For the second round of the Commercial Crew Development (CCDev-2) program, NASA awarded $22 million to Blue Origin, $92.3 million to Boeing, $80 million to Sierra Nevada Corporation, and $75 million to SpaceX. The funds, provided under Space Act Agreements, will be used by the companies to mature the proposed designs of their crewed spacecraft. They and other companies will later compete for full-scale development contracts for spacecraft that can carry astronauts to low Earth orbit to serve both NASA's needs to access the International Space Station and commercial applications. Web posted. (2011). [NASA makes CCDev-2 awards [Online]. Available WWW: http://www.spacetoday.net/ [2011 April 19].]

**Dozens of Brevard schools to get space shuttle tiles**

As Brevard County residents revel in the announcement that Atlantis will retire here, more than three dozen local schools are celebrating new NASA acquisitions of their own -- albeit on a much smaller scale. NASA awarded shuttle heat shield tiles to 7,000 schools and universities, including at least 40 on the Space Coast. All schools passed an application process to receive the 6-inch by 6-inch tiles, which protects the shuttle from extreme temperatures when the orbiters re-enter the Earth's atmosphere. Since thousands of institutions likely applied for a tile, Apollo Elementary Principal Pamella O'Kell said she was doubtful her school would get one, but felt like being on the Space Coast should give her some kind

of edge. She was thrilled when she walked into her office one day and found a package containing the tile on her desk. "I just said, 'Yes, Apollo has one, the students have one,' " O'Kell said. "A lot of our families have worked on the shuttle so we thought it was only fitting that we add it to our space memorabilia." The tile came with directions to not remove the shrink wrap it was packaged in. It also came with a card stating the tile was meant to honor 30 years of space flight and the men and women who worked on the shuttle program. O'Kell said the tile will be put in a display case in the front lobby for the school community to enjoy. The shuttle heat shield tiles protect the orbiters from extreme temperatures when the orbiters re-enter the Earth's atmosphere. NASA distributed roughly 7,000 of the lightweight tiles to schools and colleges. Web posted. (2011). [Dozens of Brevard schools to get space shuttle tiles [Online]. Available WWW: http://www.floridatoday.com/ [2011 April 18].]

**Booster stacking finished for final shuttle flight**

The past week saw the upper solid-fuel motor segments attached and the nose caps set in place atop the final space shuttle rocket boosters, completing the last buildup in the program's three-decade history. Lifting of the motor segments occurred as planned last Monday and Wednesday, followed by the forward assemblies on Thursday night and Friday morning. The completed boosters now await the planned April 25 mating of the external fuel tank. The reusable boosters, built by ATK, will provide the primary thrust to propel the space shuttle Atlantis away from Earth during the initial two minutes of flight on June 28. The 11 sections on each Atlantis booster are a mixture of refurbished and unflown elements. The forward dome for the right-hand booster, for example, hasn't launched before. There's even historic hardware dating back to the very first space shuttle mission in 1981 incorporated into Atlantis' boosters to fly on the final launch 30 years later. The upper cylinder on Atlantis' left booster flew with Columbia on STS-1, powering the program's maiden voyage with John Young and Bob Crippen. In all, Atlantis' twin boosters have reused segments and pieces that trace back to 59 previous shuttle launches and 12 ground test-firings. Web posted. (2011). [Booster stacking finished for final shuttle flight [Online]. Available WWW: http://www.spaceflightnow.com/ [2011 April 18].]

**April 19: NASA to set Endeavour's final launch date today**

Senior NASA managers will convene at Kennedy Space Center this morning to review Endeavour's readiness for a planned 3:27 p.m. April 29 blastoff on its final flight. The shuttle and a crew of six veteran astronauts led by Mark Kelly are scheduled to fly a 14-day mission to the International Space Station. They're set to deliver critical spare parts and the $2 billion Alpha Magnetic Spectrometer, a cosmic ray detector that will investigate dark matter and antimatter. Joining Kelly on the crew are pilot Greg Johnson and mission specialists Greg Chamitoff, Drew Feustel, Mike Fincke and Italian astronaut Roberto Vittori. The mission had been preparing to launch April 19, but was delayed 10 days to avoid being at the space station at the same time one Russian resupply spacecraft departed and a new one arrived. Last week, NASA announced the mission had been extended a day so the crew could help with maintenance on the station, then backtracked and said an extension would be considered once the crew was in orbit. The flight readiness review begins at 8 a.m. today. Once it's over, NASA will host a press conference featuring Bill Gerstenmaier, associate administrator for space operations; Mike Moses, shuttle launch integration manager; and Mike Leinbach, shuttle launch director. Only one more flight remains after Endeavour's before the shuttle program retires. Atlantis is targeted to launch June 28. Web posted. (2011). [NASA to set Endeavour's final launch date today [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 April 18].]

**Pratt & Whitney Rocketdyne Making Engines for New Spacecraft**

Pratt & Whitney Rocketdyne will supply the rocket engines for a new seven-person spacecraft being developed for NASA by Boeing Inc. The Crew Space Transporation-100 craft will travel into low-Earth orbit to the International Space Station and other future destinations. To take the craft into space, Pratt & Whitney will use thrusters from heritage programs, the successful hot-fire Bantam test, and its storable propellant engineering capabilities. Boeing is building the CST-100 under a $92.3 billion contract

awarded from NASA. The spacecraft made up of a crew module and service module is expected to be ready by 2015. Web posted. (2011). [Pratt & Whitney Rocketdyne Making Engines for New Spacecraft [Online]. Available WWW: http://www.sfvbj.com/ [2011 April 19].]

**Orion Program Shrinking To Save Money, Time**

Lockheed Martin has cut out an entire test article from the Orion crew exploration vehicle that it is recasting in a new role as deep-space Multi Purpose Crew Vehicle (MPCV), combining test objectives for the remaining articles in an effort to keep the vehicle within the tight schedule set by Congress. By combining the tests that will be conducted with particular test articles, the company plans to send an Orion capsule into orbit on its first test flight in 2013, according to Cleon Lacefield, the company's program manager. The first capsule produced is now being prepared for ground tests at company facilities here and once those are over, it will be reinstrumented to fly on the first ascent abort test in 2014. By dropping the test article originally intended for that evaluation — which is intended to validate the ability of the vehicle's solid-fuel escape tower to pull it off a failing launch vehicle at maximum dynamic pressure during ascent — the company has been able to start work on the test capsule that will fly to space for the first time. The first test article was built at the Michoud Assembly Facility in New Orleans, where it underwent pressure testing before being sent here for a more rigorous workout. New instrumentation is being installed to test how Orion will hold pressure with a lot of its internal systems installed, including an instrumented window to measure how the glass flexes under pressure. Acoustic testing will follow, using generic acoustic loads that should cover any of the potential launch vehicles NASA chooses for the vehicle's flight test program. Kemp points out that the Orion was designed to launch on the Ares I rocket, which was under development by Constellation before the program was terminated. If all goes according to schedule, piloted operations of the Orion could begin as early as 2016, Lockheed Martin says. Web posted. (2011). [Orion Program Shrinking To Save Money, Time [Online]. Available WWW: http://www.aviationweek.com/ [2011 April 19].]

**NASA unaware of royal conflict with shuttle launch**

The US space agency was unaware that the shuttle Endeavour's final mission to the International Space Station was in conflict with the royal wedding, a NASA chief said Tuesday. "The frank answer is no," said Bill Gerstenmaier, NASA associate administrator for space operations, when asked by a reporter if the nuptials of Prince William and Kate Middleton were a factor in the shuttle scheduling. "I didn't realize when the wedding was when we moved the launch date," said Gerstenmaier. The shuttle was initially set to launch on April 19 and was later postponed to April 29. "We kind of set that date independently." Gerstenmaier said he received a phone call from someone notifying him of the crossover after the fact, though he did not elaborate on who made that call. "That was a consideration," he allowed, but quickly pointed out that NASA considers multiple technical, weather and international space agency constraints whenever it sets a launch time. "I haven't yet put on our manifest charts 'wedding constraints' so we did not factor that in," he said. Endeavour will be the second-to-last flight of the 30-year-old US shuttle program before it closes for good later this year following the final launch by Atlantis in June. Web posted. (2011). [NASA unaware of royal conflict with shuttle launch [Online]. Available WWW: http://www.google.com/ [2011 April 19].]

**NASA Honors Pioneer Astronaut Alan Shepard With Moon Rock**

NASA will posthumously honor Alan B. Shepard Jr., the first American astronaut in space who later walked on the moon, with an Ambassador of Exploration Award for his contributions to the U.S. space program. Shepard's family members will accept the award on his behalf during a ceremony at 5:30 p.m. EDT on Thursday, April 28, at the U.S. Naval Academy Museum, located at 74 Greenbury Point Road in Annapolis, Md. His family will present the award to the museum for permanent display. NASA's Chief Historian Bill Barry will represent the agency at the event, which will include a video message from NASA Administrator Charles Bolden. ["NASA Honors Pioneer Astronaut Alan Shepard With Moon

Rock," **NASA Media Advisory #M11-077**, April 19, 2011.]

**Countdown to Endeavour: What is a Forward Air Observer?**

Capt James Woodard is a 2006 graduate of the Virginia Military Institute (VMI) who currently serves as an Air Force Mission Flight Control Officer and Range Control Officer for the 1st Range Operations Squadron at Cape Canaveral Air Force Station. He is the Forward Observer Air for the final flight of Space Shuttle Endeavour for the STS-134 mission. James is also the Mission Flight Control Officer for the Atlas V, Space Based Infrared System (SBIRS) mission on 6 May 2011. Range Safety is a risky business. Not only is the Air Force tasked with ensuring the protection of the six astronauts on board Space Transportation System-134, we are also responsible for protecting the general public from possible anomalies resulting from the launch vehicle they are manning. This responsibility, which is entrusted to Brigadier General Edwin Wilson (the Launch Decision Authority for the mission), requires several support positions to provide real-time data concerning the status of the mission. In support of this historic launch, I have the distinct honor and privilege of performing the duties of Forward Observer Air (FOA), which includes being one of the closest humans to the launch. This position, which is reserved exclusively for Shuttle launches, includes my reports on the integrity of the stack (i.e. I report whether or not the boosters, tank, and orbiter are still connected) during the early stages of the launch. The STS stack has four components including the orbiter, two solid rocket boosters, and the external fuel tank. I will act as the eyes of Mr. Tong Tang, the Mission Flight Control Officer (MFCO), when the Shuttle cannot be seen by forward ground observers, my ground counterparts, due to cloud layer obstruction. On the day of launch, the Shuttle MFCO will determine whether or not my position is mandatory for launch. This decision is based on cloud cover between 4,000 and 8,000 feet (when video or forward observers cannot verify stack integrity). **I** am proud of my role in Endeavour's final chapter, and I know we have much to look forward to with the future of manned spaceflight! Web posted. (2011). [Countdown to Endeavour: What is a Forward Air Observer? [Online]. Available WWW: http://science.dodlive.mil/ [2011 April 19].]

**SpaceX wins $75M launch escape system contract from NASA**

Space Exploration Technologies, the Hawthorne-based developer of launch vehicles, won a $75 million NASA contract to develop a launch escape system to enable the company's Dragon spacecraft to carry astronauts, the firm known as SpaceX said Tuesday. The contract was one of four given by NASA to rocket companies to develop technology to ferry astronauts to and from the International Space Station after the fleet is fully retired later this year. The other three companies to receive contacts include Boeing Co. in Huntington Beach, Blue Origin in Kent, Wash., and Sierra Nevada Corp. in Sparks, Nev. Web posted. (2011). [SpaceX wins $75M launch escape system contract from NASA [Online]. Available WWW: http://www.dailybreeze.com/ [2011 April 19].]

**April 20: President Obama to Attend Space Shuttle Launch Next Week**

President Barack Obama and his family will attend NASA's planned launch of the space shuttle Endeavour on April 29, according to a White House official. Obama and the first family are expected to watch Endeavour launch on its 25th and final mission before the shuttle - the youngest in NASA's fleet - is retired and sent to a California museum for public display. Endeavour is slated to blast off at 3:47 p.m. EDT (1947 GMT) on Friday, April 29 from NASA's Kennedy Space Center in Cape Canaveral, Fla. "We are a White House agency - we always welcome a visit from the president," Kennedy Space Center spokesman Allard Beutel told SPACE.com. Obama last visited the Kennedy Space Center a year ago, in April 2010, to make a speech to employees about the new direction he was proposing for NASA. Obama cancelled NASA's moon-oriented Constellation program in favor of human missions to an asteroid and eventually Mars. Next week's presidential visit will likely require extra security and arrangements during an already complex launch day at the seaside spaceport. "When he came here last April, that took a lot of special arrangements," Beutel said. "It's the president. It's safe to say there always have to be special arrangements." Endeavour's STS-134 to the International Space Station will include four spacewalks to

install spare parts and upgrade the orbiting laboratory. The shuttle will deliver a $2 billion astrophysics experiment, called the Alpha Magnetic Spectrometer, to the station. The shuttle mission is scheduled to last 14 days, but NASA may decide to extend the flight by up to two extra days to fit in more work, mission managers have said. Web posted. (2011). [President Obama to Attend Space Shuttle Launch Next Week [Online]. Available WWW: http://www.space.com/ [2011 April 20].]

**Shuttle Endeavour ready for final flight**

NASA's oldest external tank will help its youngest space shuttle fly on a final flight a week from Friday. Officials on Tuesday set Endeavour's launch for 3:47 p.m. April 29 after a daylong review determined the shuttle and the decade-old tank were fit to fly. Known as the "hurricane tank" and "Frankentank," the bullet-shaped orange fuel tank needed modifications after the 2003 Columbia disaster and repairs after sustaining non-structural damage during Hurricane Katrina in 2005. More recently, sections were reinforced as a precaution to prevent the kinds of cracks found and repaired on the previous tank flown, and its insulating foam suffered minor hail damage in a storm. "We reviewed in excruciating detail that this tank is really ready to fly, that there's no concerns," Bill Gerstenmaier, associate administrator for space operations, said Tuesday at Kennedy Space Center. Endeavour, which first flew in 1992, is now set to blast off on its 25th and final mission, the second-to-last flight before NASA ends the shuttle program. A veteran crew of six led by commander Mark Kelly plans to deliver spare parts and a $2 billion cosmic ray detector -- the Alpha Magnetic Spectrometer -- to the International Space Station. The mission is scheduled to last 14 days but is expected to be extended up to two days so the crew can perform maintenance on station systems. Kelly; pilot Greg Johnson; and mission specialists Greg Chamitoff, Drew Feustel, Mike Fincke and Italian astronaut Roberto Vittori plan to fly into KSC on April 26, just before the countdown's 2 p.m. start. NASA doesn't know yet whether Kelly's wife, U.S. Rep. Gabrielle Giffords, will attend the launch. Giffords is recovering from a brain injury suffered during a January shooting rampage in her Tucson, Ariz., district and awaiting doctors' approval to make the trip. Shuttle Launch Director Mike Leinbach said Endeavour was enjoying smooth preparations for next week's countdown, especially since the mission was delayed 10 days from its previous target launch date of April 19. NASA pushed back the flight to avoid conflicts with Russian spacecraft that would be coming and going from the station at the same time. The launch also comes just a few weeks after more than 500 KSC contractors were laid off in the latest round of cuts as the shuttle program winds down. Leinbach said the mood at the center was buoyed by last week's news Atlantis would retire to the spaceport's visitor complex after its final flight scheduled for June. "We know the end is coming, and we're dealing with it," he said. "I think all of Kennedy Space Center got a big boost when we got the word that we were going to be able to keep Atlantis here, so we're looking forward to the ultimate display of the ultimate spaceship." A logo painted on Endeavour's external tank depicts a shuttle rising from the eye of a hurricane. "That logo really represents to us emotionally what the tank has been through, but more importantly what the team has been through," said Mike Moses, the shuttle launch integration manager. "Katrina did nothing to our tank compared to what it did to the peoples' lives down there (in New Orleans)." Because the Lockheed Martin-built tank labeled ET-122 does not have all the modifications made to tanks built after Columbia, Gerstenmaier said foam was expected to break away from certain areas, but late enough in flight that it would not cause damage. "We reviewed everything," he said. "The team was unanimous, and we're ready to go fly." Web posted. (2011). [Shuttle Endeavour ready for final flight [Online]. Available WWW: http://www.floridatoday.com/ [2011 April 20].]

**April 21: Endeavour to chart new ground in rendezvous demo**

It's a test pilot's dream. Use an existing vehicle to try out technology for its replacement. The U.S. military does it with fighter planes, and now NASA plans to demonstrate an important piece of space navigation equipment next month on the shuttle Endeavour's last mission. Eager to put the space shuttle to use before it fades into the history books, NASA has bolted a futuristic eye-safe laser system and high-resolution digital camera inside the shuttle Endeavour's cargo bay for an unprecedented orbital ballet with the International Space Station. The objective: Assess how the next-generation navigation sensors

perform in the challenging environment of space. The laser beam and camera are the crux of a next-generation optical space navigation system. NASA and contractor teams developed the instruments to help a new manned spacecraft safely dock with the space station and reach other destinations. The practical goals of the exercise required some out-of-the-box thinking. Endeavour and its astronauts will fly a trajectory never before attempted in the shuttle's 35 previous visits to the research outpost. "It's a whole unique array of burns," said Greg Johnson, Endeavour's pilot. "The trajectory is something very different than what we've ever flown before, but it's all the same sort of things that we've been doing with rendezvous. It just looks different." Once the shuttle leaves the station at the end of the mission, Endeavour will mimic the approach of a future, still undefined, space capsule. Using its nimble flying qualities, Endeavour will undock and back away from the complex then approach the space station again. Endeavour will complete a one-lap flyaround of the outpost before firing its thrusters for two separation burns, first to depart the immediate vicinity of the space station, then to put the ship on a looping trajectory back toward the million-pound complex. Not much bigger than a kitchen microwave, miniature sensors and electronics inside Endeavour's cargo bay will be put to the test during the unique demonstration. It's called the Sensor Test for Orion Relative Navigation Risk Mitigation, but it's better known as simply STORRM. The system was designed to help the Orion spacecraft navigate its way to the space station. Although the Constellation program, including Orion, was cancelled last year, work on the capsule continues. Orion could become the basis of a multipurpose crew vehicle, a new spacecraft designed to take astronauts to deep space on missions to asteroids. It might also travel to the space station to serve as a lifeboat or ferry resident crews back and forth to Earth. The astronauts will use the shuttle's existing Ku-band rendezvous radar for on-board navigation during the demo. STORRM will simply be along for the ride. If Endeavour blasts off April 29 as planned, the shuttle's undocking and STORRM test is slated for May 11. But NASA could extend the mission by up to two days, pushing the demo to May 12 or May 13. Web posted. (2011). [Endeavour to chart new ground in rendezvous demo [Online]. Available WWW: http://www.spaceflightnow.com/ [2011 April 21].]

**Federal budget pays for summer shuttle flight**

The U.S. government budget approved last week all but validates NASA's hope to fly the shuttle Atlantis on a much-needed bonus mission as soon as June 28, according to agency officials. "We're not overly-constrained budget-wise," said Bill Gerstenmaier, NASA's associate administrator for space operations. Stephanie Schierholz, an agency spokesperson, said the budget signed into law last week "essentially" puts to rest concerns about funding the June mission of Atlantis. The extra flight, numbered STS-135, was added to the shuttle manifest to stock the International Space Station for continued operations after the shuttle's retirement. Before last week's budget passage, NASA was working on short-term funding plans and trying to accumulate money to pay for the June flight. The additional mission wasn't part of the last yearlong budget passed by Congress, but NASA was directed to fly STS-135 in the authorization act signed into law in October, which set agency priorities for the next three years. NASA now has a budget running through Sept. 30, giving the agency confidence it can afford the flight. Atlantis is scheduled to blast off June 28 with a full load of supplies and experiments packed inside the Italian-built Raffaello logistics module. After transferring cargo aboard the space station, the four-person shuttle crew will return to Earth with Raffaello filled with trash and other items NASA wants back on the ground. The shuttle will also return a failed ammonia pump for inspections and potential repair. The supplies delivered by the STS-135 mission will keep the space station operating until the end of 2012 in case the commercial operators delay their first cargo flights. Web posted. (2011). [Federal budget pays for summer shuttle flight [Online]. Available WWW: http://www.spaceflightnow.com/ [2011 April 21].]

**April 22: Endeavour one week from last launch**

Endeavour is a week from launching on its 25th and final flight, while work at Kennedy Space Center continues to ready Atlantis for the last shuttle flight this summer and to decommission Discovery after its last flight. At launch pad 39A, technicians are completing tests and closeouts on Endeavour's two solid rocket boosters and the orbiter's aft section, after pressurizing its propulsion systems earlier this week.

Techs are scheduled to take the weekend off, then get ready to start the official launch countdown at 2 p.m. Tuesday. Endeavour is scheduled to blast off at 3:47 p.m. next Friday to the International Space Station for a mission of at least 14 days. Meanwhile, in a shuttle hangar, workers are removing an orbital maneuvering system pod from the right side of Discovery's tail fin. Along with the already removed left pod and nose thrusters, the systems will be serviced at KSC and then shipped to NASA's White Sands Test Facility in New Mexico to clean them of plumbing contaminated with toxic hypergolic propellants. That's one of the major processes that must be completed before Discovery can be moved to the Smithsonian Institution in Washington, D.C., perhaps early next year. On Monday in the Vehicle Assembly Building, crews will begin connecting an external tank to the boosters that will help Atlantis launch the final shuttle mission. Atlantis is expected to roll from its hangar into the assembly building May 12, and the final shuttle stack begin rolling out to the launch pad May 20. The last shuttle crew of four astronauts will visit KSC for a countdown dress rehearsal in early June, and a tanking test is planned June 7. "Right now, all looks good for the end of June -- June 28 -- for the final flight," shuttle launch director Mike Leinbach said earlier this week. Web posted. (2011). [Endeavour one week from last launch [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 April 22].]

**Florida Braces for Huge Crowds for Friday's Space Shuttle Launch**

The Florida space coast is expecting near-record crowds to flock to Cape Canaveral to watch the space shuttle Endeavour launch on its last voyage April 29. Crowds have been getting thicker and thicker for shuttle launches as NASA winds down its 30-year-old space shuttle program. After Endeavour's mission, there is only one more shuttle flight planned before the three orbiters are retired. The area around NASA's seaside Kennedy Space Center in Cape Canaveral, where the shuttles are launched, saw between 400,000 and 500,000 visitors for the last liftoff of the shuttle Discovery in February, according to Robert Varley, executive director of Florida's Space Coast Office of Tourism. "We think we're going to do better than that this time," Varley told SPACE.com. "It's going to be a big day next week." He predicted at least half a million visitors, and likely more, for Friday's blastoff at 3:47 p.m. EDT (1947 GMT). In comparison, most regular shuttle launches draw between 150,000 and 200,000 visitors, Varley said. Where those usually bring about $4 million to $5 million in to the area, Endeavour's launch is expected to cause between a $10 million to $15 million economic impact, he said. The area has about 11,000 hotel rooms, between 4,000 and 5,000 condominiums and another 35,000 campsites, he estimated. Nearly all of those are booked for this week. The fact that next Friday's launch will be the last ever for Endeavour has certainly led to some of the boost in attendance. The liftoff is also especially high profile because President Barack Obama has announced that he will bring his family to watch in person. The visitors' center at Kennedy Space Center, which houses a museum with rockets on display, an IMAX theater, rides and more, has also seen a huge boost in traffic in recent weeks, partly due to the fact that Endeavour can now be seen standing at the ready on Launch Pad 39A. "They're experiencing extreme high numbers of visitation -- around 10,000 or 11,000 people a day out there," Varley said. And the effect is only likely to balloon for the next launch -- the June 28 liftoff of shuttle Atlantis. That is that last planned space shuttle mission ever, before all three orbiters are retired to museums. "The last one will definitely draw over a million people," Varley said. "I have no doubt. It's history." Web posted. (2011). [Florida Braces for Huge Crowds for Friday's Space Shuttle Launch [Online]. Available WWW: http://www.space.com/ [2011 April 22].]

**April 23: Russian space agency won't let private US spacecraft dock with ISS**

Russian news agencies are quoting a top space official as saying Russia won't permit a U.S. commercial spacecraft to dock with the International Space Station until it is satisfied the ship conforms to safety standards. The California-based Space Exploration Technologies Corp. has asked NASA for permission to send an unmanned cargo capsule to the space station later this year. The hookup also would need Russian clearance. Alexei Krasnov, supervisor of manned missions at the Russian Space Agency, was quoted as saying Friday that safety concerns first need to be addressed. SpaceX's Dragon capsule made the world's first private trip to and from orbit in December. It blasted off from Cape Canaveral, Florida,

atop the company's Falcon 9 rocket. Web posted. (2011). [Florida Braces for Huge Crowds for Friday's Space Shuttle Launch [Online]. Available WWW: http://www.space.com/ [2011 April 22].]

**April 24: Gabrielle Giffords gets OK to attend shuttle Endeavour launch on Friday**

Arizona congresswoman Gabrielle Giffords, recovering from a gunshot wound to her head, will attend the launch of the shuttle Endeavour on Friday, ABC News reported Sunday. Giffords wants to watch her husband, Mark Kelly, command the last mission of Endeavour, which is set to launch at 3:47 p.m. She was shot in January in the parking lot of a Tucson shopping center while meeting with constituents. Six people were killed, including a federal judge and a nine-year-old girl, and 12 others were wounded. Jared Loughner, who has pleaded not guilty, is charged in the rampage. Also expected to attend the launch at Kennedy Space Center is President Obama, First Lady Michelle and their children, Malia and Sasha. Giffords has been undergoing rehabilitation in Houston. Web posted. (2011). [Gabrielle Giffords gets OK to attend shuttle Endeavour launch on Friday [Online]. Available WWW: http://www.orlandosentinel.com/ [2011 April 24].]

**April 25: NASA Prepares To Pick Up Endeavour Countdown**

NASA is making final preparations today to close Endeavour's payload bay doors and pick up a countdown to the planned launch Friday of the nation's penultimate shuttle flight. A pretest briefing is scheduled this morning in Firing Room No. 4 at the Launch Control Center, where engineers will be called to their stations at 1:30 p.m. Tuesday. A three-day countdown will pick up 30 minutes later. Liftoff is slated for 3:47 p.m. Friday. Mission commander Mark Kelly and his crew are expected to arrive at Kennedy Space Center's Shuttle Landing Facility at 12:15 p.m. Tuesday. The astronauts went into quarantine at Johnson Space Center in Houston on Friday. The crew includes pilot Gregory "Box" Johnson and four mission specialists: Greg Chamitoff, Andrew "Drew" Feustel, Michael Fincke and Roberto Vittori of the European Space Agency. At launch pad 39A today, technicians are preparing to close the shuttle's payload bay doors for flight on Tuesday. The prime cargo is a $2 billion cosmic ray detector that will be fixed to the exterior of the International Space Station. Only one shuttle mission remains after Endeavour's flight. Atlantis is scheduled to launch on NASA's 135th and final shuttle mission on June 28. Web posted. (2011). [NASA Prepares To Pick Up Endeavour Countdown [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 April 24].]

**April 26: Shuttle crew ready to go as launch countdown begins**

The shuttle Endeavour's crew flew to Florida Tuesday for the start of their countdown to blastoff Friday on a long-awaited mission to deliver supplies, spare parts and a $2 billion cosmic ray detector to the International Space Station. Forecasters are predicting an 80 percent chance of good weather. Arriving in sleek T-38 jet trainers, commander Mark Kelly and his five crewmates -- pilot Gregory H. Johnson, Michael Fincke, Gregory Chamitoff, Andrew Feustel and European Space Agency astronaut Roberto Vittori -- landed at the shuttle runway just before 1 p.m. EDT (GMT-4) after a flight from Houston. One hour later, at 2 p.m., engineers in the nearby launch control center started Endeavour's countdown, setting the stage for launch of NASA's next-to-last shuttle mission at 3:47:52 p.m. Friday. It will be Endeavour's 25th and final mission since its maiden voyage in May 1992. Kelly thanked the thousands of engineers and technicians who worked on Endeavour over the years, joking that "we're going to take Endeavour out for a couple of more, probably five or six million more miles." NASA Test Director Jeremy Graeber said engineers were not tracking any significant issues going into the countdown and shuttle weather officer Kathy Winters said forecasters are predicting generally good weather through the weekend. The only concern is possibly high crosswinds from a front expected to move through the area Thursday night. She said the models indicate an 80 percent chance of acceptable weather Friday, dropping to 70 percent on Saturday and moving back up to 80 percent "go" on Sunday. "Overall, our main concern for launch day is going to be crosswinds," she said. "There's just a 20 percent chance of KSC weather prohibiting launch. The main thing is we just want to get that frontal system through us on Thursday evening and still be able to complete all our pre-launch operations." Engineers plan to pump liquid oxygen and hydrogen aboard

the orbiter starting at 11:30 a.m. Wednesday to power the shuttle's electricity producing fuel cells, a procedure that should be complete by around 6 p.m. After an eight-hour hold, main engine preparations will get underway along with checkout of various avionics systems. A 13-hour 20-minute hold will begin at 10 a.m. Thursday, during which communications links will be activated and checked out. A protective gantry will be pulled away from the shuttle starting around 7 p.m. Thursday, exposing the orbiter to view. If all goes well, engineers will begin pumping a half-million gallons of supercold liquid oxygen and hydrogen rocket fuel into Endeavour's external tank around 6:22 a.m. Friday. Kelly and his crewmates plan to don their pressure suits and head to the pad to begin strapping in a few minutes before noon. As with most space station flights, Endeavour's launch is timed for the middle of a 10-minute window, roughly the moment Earth's rotation carries pad 39A into the plane of the space station's orbit. Web posted. (2011). [Shuttle crew ready to go as launch countdown begins [Online]. Available WWW: http://www.spaceflightnow.com/ [2011 April 26].]

**Rocket and satellite joined together at the Cape**

With just 10 days to go until launch, a critical surveillance satellite that begins a new generation for missile early-warning detection has been mounted atop its Atlas 5 rocket at Cape Canaveral. The first Space Based Infrared System Geosynchronous spacecraft, or SBIRS GEO-1, was hauled from up the road from the processing hangar to the launcher's assembly hangar at Complex 41 before dawn Tuesday. Technicians then went to work with the delicate hoisting operations. Already packed within the rocket's pointy nose cone, the satellite slowly rose up and entered the Vertical Integration Facility where the Atlas 5 stood atop a mobile launching platform, just waiting to receive its cargo for flight. Getting the payload aboard the rocket was the last major milestone before the 19-story vehicle is wheeled to the launch pad the day before liftoff. Teams will spend the next week conducting final checks and assessments to ensure all elements are ready to go. Launch is scheduled for Friday, May 6 during a window extending from 2:14 to 2:54 p.m. EDT (1814-1854 GMT). Web posted. (2011). [Rocket and satellite joined together at the Cape [Online]. Available WWW: http://www.spaceflightnow.com/ [2011 April 26].]

**North Brevard schools close early on launch day**

Thirty schools will close early Friday in anticipation of traffic snarls expected with Endeavour's last shuttle launch. School officials announced what they called this unprecedented decision Tuesday at the urging of Titusville Police and the county's Emergency Operations Center. "Titusville has always been slammed with traffic" after shuttle launches, said Pamella O'Kell, principal at Apollo Elementary. The launch, scheduled for 3:47 p.m. Friday, is expected to draw hundreds of thousands to the Space Coast. The early dismissals will range from noon to 2 p.m. Web posted. (2011). [North Brevard schools close early on launch day [Online]. Available WWW: http://www.floridatoday.com/ [2011 April 26].]

**Navy bean and corn bread tradition**

After Endeavour clears the launch tower Friday and is in orbit, the astronauts' families will join shuttle workers in a tradition that dates back to the very first shuttle launch -- eating navy beans and corn bread. It all began innocently in 1981 when then-NASA test director Norm Carlson brought in a small crock pot of beans and some corn bread. After the successful launch, hungry workers quickly devoured the meal. Carlson repeated the menu for the second launch, this time bringing in two crock pots. Eventually he started making the beans in an 18-quart cooker. Preparing the beans and corn bread became an official NASA function when Carlson retired. About 60 gallons worth of beans will be made for Friday's launch and enjoyed once Endeavour lifts off safely. Web posted. (2011). [Navy bean and corn bread tradition [Online]. Available WWW: http://www.floridatoday.com/ [2011 April 26].]

**AT&T bulks up Brevard cellular capacity for Endeavour launch**

Add AT&T to the list of people, places and things preparing for Endeavour's historic launch on Friday. The telecommunications company will boost its capacity at 19 sites across Brevard County where crowds will watch the launch, from Mims to south of State Road 528 , according to the an announcement

Tuesday. "We wanted to make sure the capacity is up; we know that people are going to be taking pictures and sending pictures to show all of their friends that aren't going to make it," said Gretchen Schultz, AT&T a spokeswoman. Tourism officials suggest as many as 700,000 visitors could be on the Space Coast for the launch. To handle all that data, AT&T added new layers of frequency — known as "carriers" in the industry — to the 19 sites. Schultz said it was analogous to widening a road with additional lanes. And in order to ensure that communications will remain clear among local police during launch day, AT&T is bringing in a mobile cell tower, known as COLT, or Cellular On Light Truck, and installing it at the Brevard County Sheriff's Office. "We want Brevard County Sheriff's Office to maintain communications while hundreds of thousands of people flock in." Web posted. (2011). [AT&T bulks up Brevard cellular capacity for Endeavour launch [Online]. Available WWW: http://www.floridatoday.com/ [2011 April 26].]

**April 27: It's a Unanimous "Go" for Endeavour**

The Space Shuttle Program Mission Management Team voted unanimously to proceed toward Endeavour's scheduled liftoff at 3:47 p.m. EDT Friday. Mike Moses, chair of the Prelaunch Mission Management team, reported that it was a very short meeting and everything is in great shape and ready to go. "We're ready to go and we're looking forward to Friday's launch," Moses said. Mike Leinbach, shuttle launch director said, "The countdown for Endeavour's final mission is going extremely well. The launch pad right now is cleared in preparation for loading the cryogenics fuels for the fuel cell system." "We're not working any significant issues at all ... the teams are upbeat about the mission and the President's visit," said Leinbach. "We're ready to go and right now looking forward to an on-time launch Friday afternoon." The forecast calls for an 80 percent chance of favorable conditions at launch time, according to Shuttle Weather Officer Kathy Winters. The only concern for launch may be the crosswinds at the Shuttle Landing Facility. The Rotating Service Structure (RSS) is scheduled to be retracted at 7 p.m. tomorrow night but may be delayed because of possible storm activity over the center. Teams will have about a four hour leeway for the storms to clear out to rollback the RSS with no effect on Friday morning's external tank fueling, now planned for 6:22 a.m. Endeavour is headed to the International Space Station on a 14-day mission to deliver the Express Logistics Carrier-3, Alpha Magnetic Spectrometer-2 (AMS), a high-pressure gas tank and additional spare parts for the Dextre robotic helper. Web posted. (2011). [It's a Unanimous "Go" for Endeavour [Online]. Available WWW: http://www.spaceref.com/ [2011 April 27].]

**No workforce funding for the Space Coast**

Speaking at the Kennedy Space Center just over a year ago, President Obama promised $40 million for "regional economic growth and job creation" on Florida's Space Coast, $35 million of it in the form of grants through the Commerce Department to support business in the area. Late today, though, Florida Today reported that the grant program won't be funding in FY2011. The article is short on details: it claims the funds were cut from the final continuing resolution (CR) that funded the government in 2011, although it's not clear if Congress explicitly failed to fund the program or if NASA and the Commerce Department, as they drew up spending plans as required by the CR, decided not to fund the program. A spokesman for Sen. Bill Nelson (D-FL) blamed "extremists bent on wildly and blindly slashing the budget" for the cut. The other $5 million, intended to establish a commercial spaceflight technical center run by the FAA at the Cape, apparently also is not funded. Web posted. (2011). [No workforce funding for the Space Coast [Online]. Available WWW: http://www.spacepolitics.com/ [2011 April 27].]

**NASA Invites 150 Lucky Twitter Followers To Endeavour Launch**

NASA invited 150 lucky people to a behind-the-scenes perspective from the press site at the agency's Kennedy Space Center in Florida for the final launch of space shuttle Endeavour on Friday, April 29. The launch is scheduled for 3:47 p.m. EDT. The participants were selected randomly from more than 4,100 online registrants during a 24-hour opportunity in mid-March. Attendees represent 43 U.S. states, the District of Columbia, Australia, Brazil, Canada, Germany, New Zealand, Puerto Rico, Switzerland,

Venezuela, and the U.K. Participants will share their experiences with their more than 3.7 million combined followers through the social networking site Twitter. On Sunday, the agency surpassed one million followers on its flagship Twitter account, @NASA. Beginning at noon on April 28, NASA will broadcast a portion of the Tweetup when participants get to talk with NASA's Chief Scientist Waleed Abdalati; Endeavour's Flow Director Dana M. Hutcherson; International Space Station Associate Program Scientist Tara Ruttley; astronaut Clay Anderson; and Principal Investigator of the Alpha Magnetic Spectrometer-2, Sam Ting. Participants also will tour Kennedy and get a spacesuit demonstration. The Tweetup culminates with the launch. This is the fourth time NASA has invited its Twitter followers to experience a space shuttle launch. Previously, groups attended Atlantis' STS-129 and STS-132 missions and Discovery's STS-133 launch. NASA also hosts Tweetup events at other NASA centers. Web posted. (2011). [NASA Invites 150 Lucky Twitter Followers To Endeavour Launch [Online]. Available WWW: http://www.spaceref.com/ [2011 April 27].]

**Wildfire burning near Kennedy Space Center**

Officials with the U.S. Fish and Wildlife Service said there is a wildfire burning at the Merritt Island National Refuge south of the Kennedy Space Center. Refuge spokesman Dorn Whitmore said fire crews and three fire engines are at the 50-acre wildfire which is located about 1.5 miles south of the vehicle assembly building. Whitmore said the fire is quickly moving north and producing heavy smoke as it burns in an oak brush area of the preserve. He could not confirm how long it will take to knock down the blaze. Web posted. (2011). [Wildfire burning near Kennedy Space Center [Online]. Available WWW: http://www.orlandosentinel.com/ [2011 April 27].]

**Giffords at Space Center for launch preparations**

Rep. Gabrielle Giffords arrived in Florida on Wednesday afternoon, two days before her husband is scheduled to command shuttle Endeavour's final flight. The representative reportedly flew here on a NASA jet used to transport senior NASA officials and VIPs. It landed at Patrick Air Force Base at 12:47 p.m., according to Flightaware.com, which tracks air traffic. Giffords' office sent out a tweet about noon that read, "Gabrielle is traveling to Florida!" NASA always flies the crew's spouses to Florida aboard a NASA plane. Wives of the five other astronauts flew into town Tuesday and were on the runway to greet their husbands when they arrived in four T-38 training jets. NASA officials said they are pleased Giffords, who is still recovering from a gunshot wound to the head, will be able to witness husband Mark Kelly's historic flight. "Obviously, we're very pleased she's coming to the launch to support Mark and his flight," said Mike Moses, the shuttle launch integration manager at Kennedy Space Center. Giffords likely arrived in time for the traditional crew barbecue, which usually takes place two days before launch with spouses and a few selected guests at the secluded Beach House on KSC property. Liftoff is scheduled for 3:47 p.m. Friday. Web posted. (2011). [Wildfire burning near Kennedy Space Center [Online]. Available WWW: http://www.floridatoday.com/ [2011 April 28].]

**April 28: First family's visit to KSC will be brief**

President Barack Obama and his family likely will get an up-close look at one of NASA's orbiters before watching Endeavour blast off Friday on the space agency's penultimate shuttle mission. The first family -- the president, wife Michelle Obama, and daughters Malia and Sasha -- will fly to the Space Coast on Air Force One. The presidential plane is due to arrive at 2:10 p.m. at the Skid Strip at Cape Canaveral Air Force Station. The Obamas will tour the Orbiter Processing Facility, which comprises three separate hangars. Atlantis is being prepped for a planned June 28 launch on NASA's 135th and final shuttle mission in OPF Bay No. 1. Discovery is in OPF Bay No. 2, where the ship is going through post-flight servicing and work to prepare it for retirement display at the Smithsonian Institution. It launched on its 39th and final flight Feb. 24. If history is any indication, the Obamas probably will take in the launch with the Endeavour astronaut families on the roof of the Launch Control Center. President Bill Clinton and Hillary Clinton watched the 1998 launch of U.S. Sen. John Glenn from the roof of the four-story control center. One of their escorts: current Kennedy Space Center Director Robert Cabana, then a

veteran astronaut. For Obama, it's a quick visit. The president will board Air Force One and depart the Skid Strip at 4:40 p.m., heading for South Florida. Obama is scheduled to give the commencement speech at Miami-Dade College early Friday evening. NASA Shuttle Launch Director Mike Leinbach said his team is excited about the prospect of having Obama and his family at the space center for launch. But the visit won't distract NASA, and the agency won't bend safety rules to launch Endeavour while the first family is at KSC. Said Leinbach: "Absolutely not." Web posted. (2011). [First family's visit to KSC will be brief [Online]. Available WWW: http://www.floridatoday.com/ [2011 April 28].]

**Piece of Mary Rose to be flown to International Space Station**

Astronauts will take a piece of Tudor battleship Mary Rose on space shuttle Atlantis' final mission. A wooden ball, used to raise 16th century sails, will be carried on its 14-day voyage to the International Space Station. It continues a tradition of symbolic objects being taken into space. British-born veteran astronaut Michael Foale worked as a diver on the salvage of King Henry VIII's favorite ship off the Isle of Wight in 1981. Web posted. (2011). [Piece of Mary Rose to be flown to International Space Station [Online]. Available WWW: http://www.mirror.co.uk/ [2011 April 28].]

**Legos headed to space on Endeavour**

NASA is sending Lego bricks into space. Among the items being packed up and shipped off on Endeavour, Lego model kits for the shuttle, and the International Space Station. Endeavour's crew will put them together while they are in space, video tape the project, and then use it to get kids interested in space travel, and science. The shuttle kits being used are the same ones Lego fans can buy in stores. The ISS model is one of only three in the entire world, and a Lego spokesperson said it is extremely hard to put together. It's not the first time Lego bricks took a shuttle ride into space. A model space shuttle built out of Legos flew on space shuttle Discovery's last in February. Web posted. (2011). [Legos headed to space on Endeavour [Online]. Available WWW: http://www.cfnews13.com/ [2011 April 28].]

**30 percent chance weather will delay shuttle Endeavour launch**

Everything is on track for Friday's launch of the space shuttle Endeavour, with President Barack Obama, U.S. Rep. Gabrielle Giffords and as many as 700,000 onlookers along the Space Coast on hand to cheer its final mission. But the weather could disappoint everyone. Shuttle weather officer Kathy Winters said the prospects of crosswinds and cloud cover Friday afternoon have increased the probability of a weather-delayed launch to 30 percent, up from the 20 percent prediction NASA has been holding much of the week. The storm front that devastated Alabama and other southern states last night is likely to pass through Kennedy Space Center tonight but it is not expected to cause severe weather here and should be gone by midnight, she said. So it should have no effect on Friday's weather-sensitive activities, which begin with filling the rocket's external fuel tank. Winters said she would not be surprised if there were weather alerts raised during the day on Friday, but conditions should improve, and by late afternoon and should be fine for launch. "Our big concerns are crosswinds and (low cloud) ceilings lingering in the area," Winters said. Web posted. (2011). [30 percent chance weather will delay shuttle Endeavour launch [Online]. Available WWW: http://www.orlandosentinel.com/ [2011 April 28].]

**Air Force officer upbeat on launches**

After the shuttle takes its final flight, the Space Coast will still hear the familiar rocket rumble -- and reap some economic benefits -- thanks to unmanned space launches. That's the outlook from Col. James Ross, vice commander of the 45th Space Wing at Patrick Air Force Base. Ross was a guest speaker at the annual Florida's Space Coast Tourism Day Luncheon, which drew about 300 hospitality workers and tourism officials to the Radisson Resort at the Port. Ross said unmanned launches have brought as much as $1.1 billion in annual revenue into the county. He outlined a schedule of launches, and said the 45th Space Wing, which provides launch support for manned and unmanned launches and satellites, has a bright future. Out of the 13 launches this year on the Space Coast, he said, three are shuttle launches and the remainder are unmanned launches. Ross said SpaceX and other commercial companies will play a

bigger role in the post-shuttle economy. "In addition to Space X, we have other commercial companies who are seeking us, interested in coming to the Cape," he said. "A couple are really close to coming to the Cape, and I can't really tell who they are, but I can honestly say, we're going to be busy, and we're going to be even busier (in the future)." Rob Varley, executive director of the Space Coast Office of Tourism, said with the burgeoning commercial space industry and an asset such as Port Canaveral, which draws millions of cruise passengers every year, there are reasons for optimism. "I think the future is bright for us," he said. Web posted. (2011). [Air Force officer upbeat on launches [Online]. Available WWW: http://www.floridatoday.com/ [2011 April 28].]

**April 29: Electrical Problems Force Delay in Shuttle Launching**

An electrical problem forced NASA on Friday to postpone the launching of the shuttle Endeavour, giving President Obama and hundreds of thousands of spectators a lesson in the fickle nature of space technology. Less than four hours before the scheduled 3:47 p.m. liftoff, National Aeronautics and Space Administration officials announced that it would be delayed at least until Monday afternoon while technicians tried to fix the problem, which affects equipment that supplies hydraulic power to move the shuttle's engines and flaps during ascent and re-entry. Officials suggested that the launching could be delayed further. "We will not fly this machine until it is ready," said Michael D. Leinbach, the shuttle launching director, "and today it was not ready to go." The delay frustrated huge crowds that had gathered outside the space center to watch the start of the next-to-last mission in the 30-year shuttle program. Mr. Obama, who had been scheduled to watch the launching with his wife, Michelle, and daughters, was touring tornado damage in Alabama when the postponement was announced. He decided to visit the space center anyway, arriving about two hours later. At the launching control center, the president and his wife met for about 10 minutes with Gabrielle Giffords, the wounded Arizona Democratic congresswoman and wife of the mission commander, Capt. Mark E. Kelly. Just before going in to see Ms. Giffords, Mr. Obama greeted Captain Kelly in a corridor. The men shook hands and embraced. The Obamas also met with the five other members of the shuttle crew. With their daughters, they toured the building where the Atlantis spacecraft is being prepared for the 135th and final shuttle mission, in late June. They walked under the shuttle, getting a close look at its thermal tiles. The astronauts are under quarantine rules before a launching and ordinarily their contact with others, even family members, is restricted, but NASA officials said flight doctors had cleared the Obamas to meet with the crew. Ms. Giffords, who suffered a severe head wound in a shooting in January, had arrived on Wednesday to watch the launching. There was no immediate word as to whether she would stay in Florida or return to the Houston rehabilitation hospital where she has been recovering for the past two months. The astronauts had undergone final medical checks and donned orange flight suits and were on their way to the launching pad in a van when the postponement was announced. The van made a U-turn and parked briefly at the control center before returning to the astronauts' quarters. Whenever it begins, the mission, to the International Space Station, is scheduled to last two weeks. The Endeavour crew will install a $2 billion particle-physics experiment, the Alpha Magnetic Spectrometer, at the space station, where it will search for evidence of the elusive "dark matter" that is thought to be ubiquitous in the universe. The shuttle will also deliver spare parts, and the crew will perform maintenance tasks outside the station in four spacewalks. Until Friday, preparations for the mission had been relatively smooth, with weather the major concern. But postponements due to equipment problems are not uncommon, and NASA officials had previously said they would not forgo safety procedures just because the president was going to be there. Mr. Leinbach said the problem that forced the postponement was most likely an electrical short in an area of the shuttle that would take time to reach. Shortly after the decision was announced, technicians drained the spacecraft's huge external fuel tank, which had been filled with liquid hydrogen and oxygen fuel early Friday. The fuels must be removed before it is safe to work on the spacecraft. Mr. Leinbach and other officials said that depending on the extent of the problem, a Monday launching might be possible. NASA has a launching window each afternoon through Wednesday; after that the Endeavour might have to wait until May 9 or 10 to try again. Web posted. (2011). [Electrical Problems Force Delay in Shuttle Launching [Online]. Available WWW: http://www.nytimes.com/ [2011 April 29].]

**A much quieter Florida visit**

Just over a year ago President Obama visited the Kennedy Space Center to give a major space policy speech about his vision for NASA's future in space exploration. Yesterday, the president returned to KSC, a visit originally intended to watch the launch of space shuttle Endeavour on its final mission. Although the launch was scrubbed over three hours before launch, the president still made the stop with his family, spending a couple hours at the Cape before he continued on to Miami for a commencement address. Yesterday's stopover, though, was a much lower profile visit. There was no speech or other statement to the media; a handful of pool reporters trailed the president for much of his time at the center. The president apparently didn't intend to use the visit to make any significant statement about his space policy. In a press conference at KSC about the shuttle launch scrub after the president left, KSC director Bob Cabana offered only general comments about what the president said during his visit. "He was extremely supportive of what we were doing," Cabana said. "I think it was great that he came down today. I think the family really enjoyed the visit." Later, Cabana said, "The president supports our spaceflight program. He's very supportive of what we're doing," adding that the president "is supportive of us building a large rocket and crew vehicle to go beyond our home planet" as well as the commercial crew program. "Everybody that he ran into, he thanked them for what we're doing," Cabana said. "He enjoyed his tour and seeing all that he saw, and he wants us to keep doing good things." Web posted. (2011). [A much quieter Florida visit [Online]. Available WWW: http://www.spacepolitics.com/ [2011 April 30].]

**Gov. Scott, Sens. Rubio and Nelson to attend Endeavour launch**

The official VIP list for viewing the launch of space shuttle Endeavour this afternoon already included President Barack Obama and his family and wounded Arizona Congresswoman Gabrielle Giffords, wife of Endeavour Commander Mark Kelly. Add to them: Florida Gov. Rick Scott; Florida's U.S. Sens. Bill Nelson (who never misses a launch) and Marco Rubio; Florida Congressmen Debbie Wasserman Schultz, Frederica Wilson, Sandy Adams, Kathy Castor and Bill Posey; and 31 other members of Congress. Beyond them, the VIP list includes 20 current and former federal officials including former NASA administrators Dan Goldin and Michael Griffin; John Holdren, director of the White House Office of Science and Technology Policy; Chirag Parikh, director of space policy on the National Security Council; and Aaron Williams, director of the Peace Corps; Jane Lubchenco, administrator of NOAA. There also are scores of private and international VIPS, such as Ignazio La Russa, minister of defense for the Italian Parliament, Paula A. Cox, premier of Bermuda; and Virginia Hinshaw, chancellor of the University of Hawaii. Most of the VIPs will be ushered to the VIP viewing area at Kennedy Space Center. The Obamas and Giffords are expected to watch the launch from the roof of the Launch Control Center building, where astronaut spouses watch. Web posted. (2011). [Gov. Scott, Sens. Rubio and Nelson to attend Endeavour launch [Online]. Available WWW: http://www.orlandosentinel.com/ [2011 April 29].]

**Endeavour's Shuttle Launch Delay Comes with Large Price Tag**

The postponed launch of the space shuttle Endeavour on Friday (April 29) was not only disappointing for the thousands of spectators that flocked to the Florida coast to see the historic liftoff; the delay also carries a large price tag, NASA officials say. "It's the cost of propellant," NASA spokesman Allard Beutel told SPACE.com. "We capture most of the propellant back, and recycle it and use it again, but some of it gets boiled off. The propellant is really the cost." Ground crews had to drain the propellant from the shuttle's massive external fuel tank. Beutel estimates that this de-tanking process costs approximately $500,000. NASA now expects the next launch of Endeavour to occur no earlier than May 8. The bulk of the costs associated with a so-called scrubbed launch attempt come from the cryogenic liquid hydrogen and liquid oxygen propellant, and various personnel expenses. "It's contained in the overall budget," Beutel said. "It's still within the overall budget, but there are costs associated with the propellant." Endeavour was fully fueled on the launch pad at Kennedy Space Center in Cape Canaveral, Fla., when NASA called off today's launch attempt due to an issue in one of the spacecraft's critical power units. The agency is now

targeting no earlier than Monday (May 2) at 2:33 p.m. EDT (1733 GMT) for its next attempt. A recent study of 30-year space shuttle program concluded that once the program retires this year, NASA will have spent nearly $200 billion on its 135 space shuttle missions. NASA's first shuttle flight, STS-1, launched on April 12, 1981. Endeavour's upcoming flight is dubbed the STS-134 mission. One more mission, STS-135, is scheduled to fly in late June aboard the shuttle Atlantis. The recent analysis, performed by science policy expert Roger Pielke Jr., and research associate Radford Byerly, concluded that the average cost of a NASA space shuttle flight is about $1.2 billion once lifetime costs of the reusable orbiter fleet are factored in. Endeavour's STS-134 flight will be the last mission for the youngest orbiter in NASA's fleet. Following the 14-day mission, Endeavour will be retired from service and eventually put on display at the California Science Center in Los Angeles. Web posted. (2011). [Endeavour's Shuttle Launch Delay Comes with Large Price Tag [Online]. Available WWW: http://www.space.com/ [2011 April 29].]

## MAY

**May 1: NASA managers meeting to discuss Endeavour launch**

NASA managers are meeting this morning to discuss the fixes necessary to get Endeavour ready to launch. The chances of a Monday attempt appear to be dimming. Friday's planned 3:47 p.m. launch scrubbed when heaters on a fuel line linked to the orbiter's hydraulic power system failed to turn on. The fuel line in question feeds one of three auxiliary power unit on the ship. Teams were able to get into the orbiter's aft compartment Saturday to begin troubleshooting. A Monday launch was considered possible if the problem was limited to thermostats. If the switch box known as the Load Control Assembly, or LCA, is at fault, which could take days to swap out and retest. Endeavour has launch opportunities through Wednesday before NASA will give way to the planned Friday launch of an Atlas V rocket and military satellite from Cape Canaveral Air Force Station. On the next to last shuttle mission, Endeavour and its crew of six are scheduled to fly a two-week mission to deliver spare parts and a $2 billion science instrument to the station. Web posted. (2011). [NASA managers meeting to discuss Endeavour launch [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 May1].]

**NASA pushes Endeavour launch back further**

After scratching today for a possible launch of space shuttle Endeavour, NASA was still undecided Sunday when it might launch. That decision will be made today or Tuesday, with the earliest possible launch day being next Sunday. NASA on Sunday sent Navy Capt. Mark Kelly, commander of Endeavour, and his five-man crew back to Houston to wait for the next attempt. Meanwhile, NASA engineers will be trying to figure out what went wrong with an Endeavour switch box that failed Friday, causing officials to scrub the initial attempt just 3 1/2 hours before Endeavour was to lift off. If NASA cannot launch Endeavour next Sunday, the scheduling gets even more complicated. May 9 is probably not available and May 10 and May 11 present problems as well, as NASA tries to juggle Endeavour's schedule at the International Space Station with that of a Soyuz spaceship that is already there. President Barack Obama and his family also attended Friday. It was unclear Sunday if they might return, just as it was unclear when the launch might occur. "Unfortunately, we're not going to be able to make a launch attempt in the next few days," Mike Moses, chairman of the mission-management team, told reporters Sunday afternoon. "I'm here to disappoint everyone by saying I'm not going to tell you what the new launch date is because I have no idea. We have a lot more to evaluate." Friday's launch attempt was scrubbed because a hydraulic system fuel-line heater failed. Officials had hoped the problem was simply a faulty thermostat, and had proposed a Monday launch on that chance. But once technicians got inside the Endeavour's aft equipment bay late Saturday, they realized that the problem originated in a switch box called a load-control assembly. To replace that, engineers have to retest many of the systems that box controls in Endeavour, and those evaluations would take at least a couple of days, eliminating any prospects of a launch early this week. The latter part of this week is not available to NASA because the Air Force intends to launch an Atlas V rocket from Canaveral Air Force Station, adjacent to Kennedy Space Center, Friday, to carry a satellite into space. That launch eliminates Thursday, Friday and Saturday options for Endeavour. That leaves Sunday. But Moses and other NASA officials are not yet optimistic about Sunday, because there is so much yet to evaluate with the switch-box problem. "We can tell you pretty much it's not going to be earlier than the 8th. That doesn't mean we're going to go launch on the 8th," Moses said. The next three days become problematic because the Russians are planning to undock their Soyuz spacecraft from the International Space Station about the same time that Endeavour would be undocking, and the two maneuvers will not be attempted on the same day. Officially, Endeavour's mission is 14 days long, with the prospect that NASA could add two more days. Unofficially, NASA already is counting on a 16-day mission. A launch date on May 9 would mean Endeavour would have to leave the space station the same day as the Soyuz, if the mission runs 16 days. A May 10 launch would cause that conflict for a 15-day Endeavour mission. A May 11 launch would create that conflict for a 14-day mission. "You can almost say here we are 99 percent ready to call this a

16-day mission rather than a 14-day mission," Moses said. "But we didn't want to commit to them just yet until we got into orbit and evaluated other conditions. ... We'll sit down and look at all the new math and see where we're at." Any delay past May 10 could start affecting the launch schedule for the next, and final, space shuttle. Atlantis is set to go up June 28. "On paper right now, it looks like we're OK, but if we go past the 9th or 10th, we might have to add another couple of days [to the Atlantis launch schedule]," Moses said. Web posted. (2011). [NASA pushes Endeavour launch back further [Online]. Available WWW: http://www.orlandosentinel.com/ [2011 May1].]

**Astronauts Depart KSC After Launch Delay**

The Endeavour astronauts are en route to Ellington Field in Houston in the wake of a decision to delay the tentatively scheduled launch Monday of NASA's next-to-last shuttle mission. Mission commander Mark Kelly and five crewmates departed Kennedy Space Center's Shuttle Landing Facility about 10:10 a.m. in a Gulfstream 2 and are scheduled to arrive at Ellington about 12:15 p.m. Eastern Daylight Time. The NASA 2 aircraft that brought Kelly's wife -- critically wounded U.S. Rep. Gabrielle Giffords -- to the Space Coast to watch Endeavour's launch flew to Patrick Air Force Base from Ellington early today. The plane is scheduled to depart Patrick at 12:10 p.m. and arrive at Ellington at 2:23 p.m. EDT. Web posted. (2011). [Astronauts Depart KSC After Launch Delay [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 May1].]

**May 2: Old Reliable: The story of the Redstone**

Fifty years ago this week, a modified Redstone missile topped with a Mercury capsule called Freedom 7 launched the first American, Alan Shepard, into space. While Freedom 7 did not enter orbit like Yuri Gagarin had done on the first Vostok flight the previous month, it was this country's first tentative step into the arena of manned spaceflight. By this point in time, the Redstone missile was well known to the American public. In addition to being the launch vehicle for the first Mercury suborbital test flights, it also served as the launch vehicle for America's first Explorer satellites only three years earlier. Outside of the limelight of Space Age achievements, the Redstone also served as a powerful weapon on the frontlines of the Cold War. After the end of World War II, the core of the team led by Wernher von Braun that developed and built the German A-4 missile (also popularly known as the V-2) were relocated to the United States to begin ballistic missile development for the US Army. What would become the Redstone started as a design study called Hermes C in the late 1940s. The Hermes program was a series of experimental rockets that combined proven German A-4 technology with new American innovations. As such, the Redstone is a direct descendant of the A-4. In July 1950, a feasibility study began for a ballistic missile with an 800-kilometer (500-mile) range based on the Hermes C work. Web posted. (2011). [Old Reliable: The story of the Redstone [Online]. Available WWW: http://www.thespacereview.com/ [2011 May2].]

**Shuttle might launch Sunday**

NASA is pushing back Endeavour's last launch to at least Sunday and perhaps May 10 so a faulty electronic switch box can be replaced, officials said Sunday. The switch box is crucial to shuttle operations and flight safety. It routes electrical power to nine critical systems, including hydraulic system heaters that failed and forced a launch scrub Friday. A new switch box will be installed Tuesday, and required retesting is extensive. NASA on Sunday was not ready to commit to a firm date for the second attempt to launch Endeavour's 25th and final mission. "We still have a lot of work and a lot of off roads that could take us one way or another. But we're not going to try any earlier than (Sunday)," NASA Shuttle Launch Integration Manager Mike Moses said. "Don't take that as a launch date. Take that as a target." The faulty switch box supplies electrical power to the shuttle's main engines, its solid rocket boosters, its twin maneuvering engines and life support systems. Last Friday the box failed to route power to heaters on fuel lines that feed one of Endeavour's three Auxiliary Power Units. The APUs provide the hydraulic power needed to steer the shuttle's main engines in flight and control its wing flaps, rudder-speedbrake, landing gear and brakes during atmospheric re-entry and landing. Failed heaters

might result in hydrazine freezing within fuel lines during operations in orbit, where temperatures range between 250 degrees Fahrenheit and minus 250 degrees. That might prompt a leak of highly flammable fuel in the shuttle's rear engine compartment during atmospheric re-entry and landing. A hydrazine fuel leak caused two of Columbia's Auxiliary Power Units to catch fire during atmospheric re-entry on NASA's ninth shuttle flight. The close call concluded with a safe landing. But it also pointed up the potential catastrophic consequences of rocket fuel fires in the engine compartment. NASA during the weekend began preparing Endeavour for the removal and replacement of the faulty switch box. The shuttle's 15-story external tank was drained and engineers began backing out of countdown operations. The tanks that feed liquid hydrogen and liquid oxygen into the shuttle's power-producing fuel cells must be emptied. The small explosive devices used to separate the shuttle from its mobile launcher platform, solid rocket boosters and external tank in flight must be disconnected. And Endeavour will be electrically powered down. "That effectively takes us out of the launch countdown," NASA Shuttle Launch Director Mike Leinbach said. The faulty switch box will be removed on Monday, and the newly installed unit will be tested on Wednesday and Thursday. Web posted. (2011). [Shuttle might launch Sunday [Online]. Available WWW: http://www.floridatoday.com/ [2011 May2].]

**Crews work to ready Endeavour for next attempt**

Kennedy Space Center teams today plan to remove from shuttle Endeavour a faulty electronic switch box that scrubbed last Friday's launch attempt. A new launch date could be set today or tomorrow. For now, NASA is only saying the launch will be no sooner than 12:09 p.m. Sunday, Mother's Day. Over the weekend, a rotating service tower at launch pad 39A was closed around Endeavour, and cryogenic propellants were drained from the orbiter's fuel cell system. The roughly 45-pound box called the Load Control Assembly is located in an avionics bay inside an access door to the orbiter's left aft compartment. The box routes power to dozens of functions associated with nine different systems. On Friday, it failed to turn on heaters that cover a fuel line feeding a unit that generates hydraulic power. A replacement box was expected to be installed Tuesday, and then retests of all the systems with power switched to them, including some deep in the aft compartment would take a full two days. As a result, Endeavour won't launch until after Friday's planned launch of a United Launch Alliance Atlas V rocket with a missile warning satellite from Cape Canaveral Air Force Station. Then NASA will determine which launch date works best so that Endeavour wouldn't be scheduled to depart the International Space Station on the same day as a Soyuz spacecraft. That was expected to be a conflict for a May 9 launch, but plans are being assessed. Web posted. (2011). [Crews work to ready Endeavour for next attempt [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 May2].]

**Behind the Scenes at SpaceX's Space Launch Complex 40**

Space Exploration Technologies (SpaceX) took members of the media on a tour of Launch Complex 40, where the New Space firm has successfully launched two of its Falcon 9 rockets and one of its Dragon spacecraft (the first entity other than nations or government bodies to do so). For the media, this tour was an eye-opening experience. SpaceX had obviously worked long and hard to allow the world to get a grasp what it is that they are doing – while at the same time avoiding International Travel in Arms Regulations (ITAR) related issues. In a well-choreographed affair the tour was split into two separate groups, one checked out the Falcon 9 hangar, while the other group inspected the launch pad that sent last December's Falcon 9 flight on its date with history. One enters the hangar and is greeted by the impressive site of nine Merlin engines facing them – the business end of the next Falcon 9 rocket being prepped for launched. Despite the eye-candy on display it is the simple elegance of what is described that sells this place. The horizontally integration system allows the rocket to be extremely mobile (about four people could move one of the rocket's stages around). The system's frictionless design is what allows SpaceX such ease of mobility. "Our concept of operations is unlike anybody else's that is flying these days with the exception of the Russians and maybe Sea Launch," said SpaceX's Director of Mission Assurance and Integration Scott Henderson. "We use horizontal integration, we will build an entire booster here in the hangar so you have the first stage and the interstage are here now, the second stage

will arrive, the Dragon and trunk will arrive and we'll put all that together, test it inside the hangar and then when we are ready to roll out for launch we'll open this hangar door, you saw the vertical transporter-erector outside, that would lower down on pistons, we'd roll that whole structure…into the hangar drive the transporter-erector beneath the rocket, then roll out to the launch pad and lift it vertical." After this segment of the tour wraps up we move outside to the launch pad. The most striking contrast to other launch sites at Kennedy Space Center and Cape Canaveral Air Force Station is that it isn't vertically-based. Rather the Falcon 9 rolls out horizontally and is moved into the vertical position much in the same way as the Russian Soyuz and Progress vehicles are. Also, the launch pad has been simplified, this highlights SpaceX's philosophy as well as helps the company. If something does get damaged during launch, it requires minimal effort to repair and reset the launch pad for the next mission on the horizon. Web posted. (2011). [Behind the Scenes at SpaceX's Space Launch Complex 40 [Online]. Available WWW: http://www.universetoday.com/ [2011 May2].]

**Atlas 5 rocket set for blastoff on Friday afternoon**

The early weather forecast for Friday's scheduled launch of the Atlas 5 rocket from Cape Canaveral carrying a missile warning satellite is predicting good conditions for the blastoff. Air Force meteorologists have set the odds at 80 percent favorable for liftoff during the afternoon launch window running from 2:14 to 2:54 p.m. (1814-1854 GMT). The only slight concern is violating the cumulus cloud rule. "High pressure and fair weather over Central Florida through Tuesday in advance of next cold front on Wednesday. The cold front transits the peninsula through the day on Wednesday with isolated showers and a small lightning threat. The front is expected to be South of Central Florida Thursday morning and stalling in South Florida on launch day," forecasters say. "On launch day, high pressure continues to build into Central Florida with winds becoming easterly with gusts in the mid to upper teens through the count and window. The primary concern for launch is a small threat of cumulus clouds. The launch time conditions are predicted to include scattered clouds at 3,000 and 24,000 feet, possibly some isolated showers, good visibility, easterly winds of 12 to 16 knots and a temperature of 77 degrees F. "In the event of a 24-hour delay, similar conditions prevail," forecasters say. Web posted. (2011). [Atlas 5 rocket set for blastoff on Friday afternoon [Online]. Available WWW: http://www.spaceflightnow.com/ [2011 May2].]

**Two Events Commemorate 50th Anniversary of U.S. Human Spaceflight**

NASA Administrator Charles Bolden will commemorate the 50th anniversary of the first U.S. manned spaceflight during two events this week around the agency's Kennedy Space Center in Florida. NASA Television will carry both events live. On Wednesday, May 4, at 2 p.m. EDT, the U.S. Postal Service will unveil two new stamps at the Rocket Garden of the Kennedy Space Center Visitor Complex, located on State Road 405. One stamp commemorates NASA's Project Mercury and Alan Shepard's historic launch on May 5, 1961 aboard the spacecraft Freedom 7. The second stamp honors NASA's MESSENGER, which reached Mercury in March to become the first spacecraft to orbit the planet. The two missions frame a remarkable 50-year period in which America advanced space exploration through more than 1,500 manned and unmanned flights. Mercury astronaut Scott Carpenter and members of the Shepard family will join Bolden at the stamps' unveiling and at a 50th anniversary ceremony on Thursday, May 5, at 9 a.m., at the Cape Canaveral Air Force Station. The Thursday event includes a re-creation of Shepard's flight and recovery, as well as a tribute to his contributions as a moonwalker on the Apollo 14 lunar mission. KSC Director and former astronaut Bob Cabana and more than 200 workers from the original Mercury program, also will be in attendance. Web posted. (2011). [Two Events Commemorate 50th Anniversary of U.S. Human Spaceflight, **NASA Media Advisory #11-088** [Online]. Available WWW: http://www.nasa.gov/ [2011 May2].]

**May 3: Space Florida Gets Budget Agreement**

Florida Gov. Rick Scott and the Legislature have reached an agreement that will give Space Florida a $10 million budget and access to millions in seed funds while placing it within a larger development

organization. Space Florida, the public-private economic development arm, would remain a separate entity with the power to issue tax-free bonds, but it would answer to the board of directors of Enterprise Florida, the statewide economic development agency. Enterprise Florida would be headed by a secretary of commerce appointed by the governor and confirmed by the Senate. Space Florida would receive $10 million a year from the state, but under the new arrangement, it would have greater access to the seed fund. Negotiators agreed to a $120 million fund that would be available next year. Web posted. (2011). [Space Florida Gets Budget Agreement [Online]. Available WWW: http://www.parabolicarc.com/ [2011 May3].]

**Endeavour will carry work of McCormick Professor**

When the Space Shuttle Endeavour finally launches May 8, it will be taking a little bit of Northwestern with it. McCormick Prof. Mark Hersam has developed a new material that could benefit spacecraft construction and help make solar batteries — if it can withstand the harsh conditions of outer space. To test the material's durability, Hersam will send samples of the it up with NASA's Space Shuttle Endeavour. Hersam said in an email that he teamed up with Ph.D. student Liam Pingree about two years ago, and they put the material on a waiting list to be sent off into space. The samples were finished about 18 months ago, Hersam wrote, and are finally ready for the big trip. The material is a thin film made of carbon nanotube and graphene, which, according to Hersam, is "exceptionally stable under a variety of conditions," as he has seen in his five years of working with it. Hersam said the material could be damaged by radiation, which is much stronger in outer space than behind earth's protective ozone layer. If the material holds, it could be used on earth to generate renewable energy or in space to improve satellites. Hersam said if the films prove stable, he envisions them being used in the next generation of space craft. "I will be eagerly anticipating the results of our experiments," he said. "The launch is just the beginning of this story." Web posted. (2011). [Endeavour will carry work of McCormick Professor [Online]. Available WWW: http://www.dailynorthwestern.com/ [2011 May3].]

**STS-135: Atlantis rollover moving to May 16 – Launch may slip to July 4**

With schedules continuing to be refined based on Endeavour's troubleshooting efforts, Kennedy Space Center (KSC) teams were told on Tuesday that Atlantis' rollover is being moved to a May 16 placeholder, while the launch date – which continues to target June 28 – may slip to July 4, based on a shortage of contingency days. No firm changes to the launch date will be made until after Endeavour launches. Atlantis will mark the final launch of the Space Shuttle Program when she heads uphill for a swansong mission to the International Space Station (ISS), carrying a packed MPLM (Multi-Purpose Logistics Module), along with a LMC (Lightweight Multi-Purpose Carrier). Although early mission planning showed a preference to launch Atlantis as late as possible, in order to reduce the gap between the massive capability of the orbiters and the opening operational missions from the commercial resupply vehicles, June 28 became the solid launch date target for several months - per discussions between Shuttle and Station managers. Atlantis' rollover from her Orbiter Processing Facility (OPF-1) to the Vehicle Assembly Building (VAB) was tracking May 12, before being pushed up to May 10 to allow for a two day mating operation, caused by a shortage in specialist engineers tasked with the transfer of the orbiter from the transfer aisle to the awaiting ET-138 and Solid Rocket Booster stack. Such an operation normally takes one day to complete. That rollover date has slipped to May 16 and may slip further based on Friday's upcoming decision on Endeavour's launch date, which will be made following an update on progress of retests which are to be carried out on the soon-to-be-installed Aft "Load Control Assembly" (ALCA-2). With only two to three weekend days of contingency time remaining in the STS-135 flow, Endeavour's impacts now hold the potential of slipping Atlantis' launch date from the June 28 placeholder, with the Tuesday meeting noting a July 4 launch date is being considered. Web posted. (2011). [STS-135: Atlantis rollover moving to May 16 – Launch may slip to July 4 [Online]. Available WWW: http://www.nasaspaceflight.com/ [2011 May3].]

**May 4:** **Stamps celebrate pioneering Mercury spaceflights**

In a 2 p.m. ceremony today at the Kennedy Space Center Visitor Complex, the U.S. Postal Service will unveil postage stamps commemorating NASA Mercury missions past and present. One stamp celebrates Thursday's 50th anniversary of the Project Mercury flight that made Alan Shepard the first American to fly in space, aboard the Freedom 7 capsule. A second stamp pays tribute to NASA's unmanned Messenger mission, which launched from Cape Canaveral in August 2004 and in March became the first spacecraft to enter orbit around Mercury. Today's First-Day-of-Issue dedication ceremony will be held in the Visitor Complex's Rocket Garden, next to a seven-story Redstone rocket like the one that boosted Shepard's pioneering 15-minute, 28-second suborbital spaceflight. Special guests include Project Mercury astronaut Scott Carpenter, Mercury/Apollo astronaut Shepard's daughters, NASA Administrator Charles Bolden, Kennedy Space Center Director Robert Cabana, NASA Deputy Director of Planetary Science Jim Adams, and U.S. Postal Service Vice President of Finance & Planning Stephen Masse. On Thursday, another celebration at Cape Canaveral Air Force Station will include more than 200 Mercury program workers and a re-creation of Shepard's flight. Web posted. (2011). [Stamps celebrate pioneering Mercury spaceflights [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 May4].]

**Crews installing new switch box on Endeavour**

Shuttle Endeavour should have a new electronic switch box in place this morning, paving the way for the vehicle's final flight. Technicians were scheduled to work through the night to install the new switch box in the orbiter's engine compartment after removing one that failed Friday, forcing a launch scrub as crowds gathered on the Space Coast to witness the next-to-last mission in the shuttle program. "They are doing testing on the one they removed to help determine what caused it to fail," said Allard Beutel, a Kennedy Space Center spokesman. It will take at least two days to complete the testing. NASA officials said Tuesday is the earliest Endeavour will launch. A more definite launch date probably won't be known until Friday, when managers reconvene. "They are methodically going through each step to make sure they don't cause any other issues while they fix the one issue we know about," Beutel said. NASA officials also announced Tuesday that Endeavour's delay is forcing the rollout of shuttle Atlantis to be pushed back a few days. Atlantis will begin its final rollout to launch complex 39A on the evening of May 23, three days later than scheduled. "That is to get it completely clear of any Endeavour activity," Beutel said. It takes eight days to turn a pad around and get it ready for a new vehicle. However, Beutel said the target launch date for the final flight of the shuttle program remains June 28. He denied rumors that Atlantis' new target launch date was changed to July 4, making way for a perfect patriotic end to the 30-year-old shuttle program. "Right now there is no need to do any adjusting of that target launch date," Beutel said. Web posted. (2011). [Crews installing new switch box on Endeavour [Online]. Available WWW: http://www.floridatoday.com/ [2011 May4].]

**May 5: Shepard honored on 50th anniversary of historic flight**

Fifty years to the moment Alan Shepard rocketed away, more than 100 Project Mercury workers joined former astronauts and NASA leaders at the original Redstone launch pad Thursday to celebrate the event that opened space travel to Americans. Shepard became the first American in space on May 5, 1961, soaring 116 miles high in his Freedom 7 capsule. The Soviet Union's Yuri Gagarin beat him into space by just 23 days. Then, as now, those who helped launch Shepard took solace in the fact that "it was the first one for the free world." Shepard died in 1998 at age 74. NASA played the original capsule recording of his voice for the entire 15-minute flight, during the hour long ceremony. "Roger, liftoff, and the clock has started," Shepard called out, the boom of the liftoff in the background. The recording of the fight was timed precisely to the second of the 9:34 a.m. launch time. A compilation of TV footage from that day — the launch itself and the huge crowds on the beaches — played on a giant screen near the stage. In the background, a replica of the Mercury Redstone rocket stood on the actual launch pad. Former shuttle astronauts winced as Shepard reported the building G's — nine times the force of gravity and more — during the initial descent. Some of the Project Mercury team had to support themselves with canes and walkers. But they stood proudly when asked to rise and be recognized by the hundreds of others gathered

there at the Cape Canaveral Air Force Station. All three of Shepard's daughters sat in the front row, surrounded by about 25 family members, including two of the astronaut's great-grandchildren. One of the daughters, Alice Wackermann — whose birthday is May 5 — recalled how she and her sisters and mother watched the launch on their black-and-white TV set at home in Virginia Beach, Va. Police officers and journalists jammed the family's front yard, and not realizing the crowd was there for them, she alerted her mother, "Oh my, there's stuff going on in the neighborhood." Only two of the original Mercury 7 astronauts are still alive. John Glenn, the first American to orbit the Earth, could not attend the celebrations because of a death in the family. But Scott Carpenter was on hand. Carpenter recalled how he and fellow astronaut Walter Schirra flew the chase planes for Shepard's launch. They lost sight of the rocket at 3,000 feet. Retired NASA engineer Norm Perry, 77, said Shepard's successful flight was "a big boost, I mean major," given that the Soviets had scored two victories with the launch of the world's first artificial satellite, Sputnik, in 1957, and Gagarin's flight on April 12, 1961. Shepard later became the fifth man to walk on the moon as commander of Apollo 14. It was barely three weeks after his Mercury shot that President John F. Kennedy announced America would launch a man to the moon and safely return him by decade's end. Web posted. (2011). [Shepard honored on 50th anniversary of historic flight [Online]. Available WWW: http://www.usatoday.com/ [2011 May5].]

**Shepard launch – 50 years ago – was big for JFK, NASA, U.S.**

May 5, 1961 – 50 years ago – the new President John F. Kennedy was off to a rough start and so was NASA, and the United States was getting its rear-end kicked by the Soviet Union in the Space War. NASA was about to launch its first astronaut – Alan Shepard – into space. If the mission was successful, NASA would have a big victory, the United States would finally have a space triumph and Kennedy would finally have something that didn't go completely wrong. Sitting on Kennedy's desk, the bold moon-project proposal that would forever define him and NASA. But did he dare to do anything with it if the Mercury launch went wrong, especially if Shepard was killed, as many feared might happen? After all, NASA's rockets weren't exactly riding an impressive record of reliability in those days. At 9:34 on the morning of May 5, 1961, as America watched on black-and-white TV, the Redstone blasted off, cleared the pad and rushed skyward. Seconds later, Shepard radioed down, "Ah, Roger liftoff, and the clock is started." Just over 15 minutes later Shepard splashed down safely in the Atlantic Ocean, just outside the Bahamas, and everything had changed for NASA, and JFK. Web posted. (2011). [Shepard launch – 50 years ago – was big for JFK, NASA, U.S. [Online]. Available WWW: http://www.orlandosentinel.com/ [2011 May5].]

**KSC launch pad fall case closed**

A Titusville man's fatal fall from a shuttle launch pad at Kennedy Space Center has been ruled a suicide by the Brevard County Medical Examiner's Office. Around 7:40 a.m. March 14, James D. Vanover, a 53-year-old United Space Alliance engineer, fell about 130 feet from the 215-foot level of launch pad 39A, according to reports by the medical examiner and the Brevard County Sheriff's Office. He was pronounced dead at the scene. According to the reports, Vanover had expressed concern that he was going blind due to high blood pressure. They also noted he'd had second thoughts about volunteering for a layoff scheduled to take effect April 8. The medical examiner's office found no evidence of eye degeneration. Vanover began working at the space center in 1982. He received several company honors and a NASA's Silver Snoopy award, presented by astronauts for contributions to mission safety. Web posted. (2011). [KSC launch pad fall case closed [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 May5].]

**Feds say they will hire 50 for new commercial spacecraft center at KSC**

Officials with the Federal Aviation Administration released more details Thursday about a proposed commercial spaceflight facility at Kennedy Space Center, noting the center would hire 50 workers over the next two years. The center — initially, part of $40 million pledge last year by President Barack Obama to help the Space Coast — is all that remains of that promise; the money was cut during budget

negotiations earlier this year. The White House has proposed $5 million for the center in 2012, in an effort to ameliorate the impact of the loss of 7,000s in Florida after the space shuttle's final mission this summer. Workers with the Commercial Spaceflight Technical Center would be tasked with spaceflight safety, safety investigations and accident prevention. Hoping to head off criticism, George Nield, FAA associate administrator for commercial space transportation, said it wouldn't overlap with NASA. "NASA has a separate mission," he said in a statement to the House space and aeronautics subcommittee on Thursday, noting that NASA would focus more on getting its astronauts to the space station while the FAA would oversee regulations for the burgeoning space tourism industry. "Establishment of the Commercial Spaceflight Technical Center will enable the FAA to strengthen its partnership with NASA, drawing on NASA's expertise and experience in space operations and human spaceflight to augment the FAA's experience in licensing and regulating ..." Nield said. But at least one lawmaker questioned whether bolstering the FAA's involvement in space was the best use of money when NASA was around. Said U.S. Rep. Dana Rohrabacher, R-Calif.: "It might be beneficial to use the staffs that we already have and the expertise we already have." Rohrabacher supports commercial spaceflight but said he is concerned about over-regulation. Web posted. (2011). [Feds say they will hire 50 for new commercial spacecraft center at KSC [Online]. Available WWW: http://www.orlandosentinel.com/ [2011 May5].]

**May 6: NASA's next-to-last shuttle launch delayed until at least mid-May**

The next-to-last space shuttle flight has been delayed again, this time to at least the middle of May for extra electrical tests. Mission managers decided Friday that shuttle Endeavour would blast off no earlier than May 16. The space station delivery mission has been on hold for a week. A heater malfunction halted the countdown April 29, and the trouble was traced to a switch box in Endeavour's engine compartment. The box was removed, and this week engineers discovered a blown circuit inside. NASA spokeswoman Candrea Thomas said testing will be conducted throughout the weekend to find out if the circuitry problem was in the old box or somewhere in the external wiring that's still in the shuttle. A new unit was installed Wednesday. Commander Mark Kelly will lead Endeavour's six-man crew to the International Space Station. They will deliver a $2 billion particle physics detector along with station spare parts. A launch on May 16 would be at 8:56 a.m. EDT. Only one other shuttle mission remains, by Atlantis this summer. That liftoff is targeted for June 28, but could be pushed back by Endeavour's repeated delays. NASA is under presidential direction to end the 30-year shuttle program as soon as possible and to focus on interplanetary travel. Private companies, meanwhile, are competing for the opportunity to carry cargo and crew to the space station. Web posted. (2011). [NASA's next-to-last shuttle launch delayed until at least mid-May, more electrical work needed [Online]. Available WWW: http://www.orlandosentinel.com/ [2011 May 6].]

**Countdown underway for today's Atlas 5 rocket launch**

An Atlas 5 rocket is scheduled for blastoff from Cape Canaveral today at 2:14 p.m. EDT carrying the inaugural spacecraft in the U.S. military's modernized approach to missile warning. The weather outlook for this afternoon's 40-minute launch window has been downgraded to 40 percent favorable. Air Force meteorologists are calling for rain showers and isolated thunderstorms, scattered low clouds at 2,500 feet, a broken deck of mid-level clouds at 10,000 feet and overcast skies at 25,000 feet, good visibility, southeasterly winds of 14 to 18 knots and a temperature of 77 degrees. Cumulus clouds and lightning are potential threats to violating the launch weather rules today. But the forecast for tomorrow, if the launch is delayed for some reason, predicts a 90 percent chance of good weather. The odds are 80 percent favorable on Sunday. Today's launch window extends from 2:14 to 2:54 p.m. EDT. Web posted. (2011). [Countdown underway for today's Atlas 5 rocket launch [Online]. Available WWW: http://www.spaceflightnow.com/ [2011 May 6].]

**May 7: Scherer, second leader of KSC, dies**

Lee Scherer, who led Kennedy Space Center through its last major transition between human spaceflight programs, will be remembered in a service later this month near his home in San Diego, Calif. Scherer,

KSC's second center director from 1975 to 1979, died May 7 at age 91. "He was a lifelong KSC advocate, often joining us on launch days," Bob Cabana, KSC's current director, said in a note to employees. "We have lost one of our biggest boosters, and he will be missed." Scherer took charge of KSC on Jan. 19, 1975, as the center was still winding down from the Apollo program and undergoing a transformation to prepare for the new shuttle program. "It was a time of real transition," said Cocoa Beach resident Hugh Harris, chief of the center's public affairs office at the time. "Everything was in the process of either being constructed or changed." The Vehicle Assembly Building and two launch pads were converted from Apollo to shuttle uses, three orbiter hangars were built and the 15,000-foot concrete shuttle runway completed. A former Naval aviator, Scherer took pride in being the first pilot to land on the runway in "NASA-6," a twin-engine Beechcraft. The first shuttle orbiter, Columbia, arrived at KSC in March 1979, months before Scherer transferred to a position at NASA headquarters. The Apollo-Soyuz Test Project was the spaceport's only manned launch during Scherer's tenure, on July 15, 1975. The center also oversaw more than 50 unmanned launches, including Viking and Voyager interplanetary probes. Lee Richard Scherer was born Sept. 20, 1919, in Charleston, S.C. He graduated from the U.S. Naval Academy in 1942 . His 25-year Navy career included World War II combat assignments in the Pacific. Joining NASA in 1962 on loan from the Navy, Scherer managed a program that launched five lunar orbiters mapping Apollo landing sites. He then joined the office that helped select those landing sites and developed science experiments for the missions. Before joining KSC, he directed NASA's Dryden Flight Research Center at Edwards Air Force Base in California. Scherer is survived by his wife, Sheryn, four children and nine grandchildren. A memorial service will be conducted June 12 at The Unity Center in San Diego. Web posted. (2011). [Scherer, second leader of KSC, dies [Online]. Available WWW: http://www.floridatoday.com/ [2011 May 7].]

**Atlas V Hauls Up New Missile-Warning Satellite**

A new-generation missile-warning satellite is on its way to an operational station 22,300 miles above Earth after a sporty launch Saturday aboard a United Launch Alliance Atlas V rocket. Its first stage powered by a Russian RD-180 engine, the 19-story rocket sprinted off its Cape Canaveral Air Force Station and arced out over the Atlantic Ocean on its way into orbit. The powerful Atlas V hauled up a $1.2 billion Space-Based Infrared System spacecraft -- a follow-on to Defense Support Program missile warning satellites that have served the nation since the 1970s. The SBIRS spacecraft is outfitted with sophisticated infrared sensors that can instantly detect enemy missile launches and then transmit targeting data so the missiles can be destroyed before they reach their intended destinations. The launch came on a second attempt. An initial try was scrubbed Friday as a result of bad weather. Web posted. (2011). [Atlas V Hauls Up New Missile-Warning Satellite [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 May 7].]

**United Launch Alliance Marks 50th Successful Launch**

A United Launch Alliance Atlas V rocket carrying the Space-Based Infrared System (SBIRS) satellite for the United States Air Force lifted off from Space Launch Complex-41 here at 2:10 p.m. EDT today. This marks the 50th successful launch for ULA since the company was formed in December 2006. ULA's next launch is the Delta II Aquarius mission currently scheduled for June 9, 2011 from Space Launch Complex-3 at Vandenberg Air Force Base, Calif. Web posted. (2011). [United Launch Alliance Marks 50th Successful Launch by Delivering the Space-Based Infrared System (SBIRS) Satellite to Orbit for the U.S. Air Force [Online]. Available WWW: http://www.prnewswire.com/ [2011 May 7].]

**Astronaut parade heralds heroes**

Famed Mercury 7 astronaut Scott Carpenter climbed into Eric Martin's regal-turquoise 1958 Corvette, settled into parade-waving position and prepared for ignition. But before the astronaut parade, vintage cars and Space Coast history hit the streets of downtown Cocoa Beach on Saturday, one of America's enduring space heroes spent time with those clamoring to take pictures of him at the old "Glass Bank" on South Atlantic Avenue. Carpenter, who turned 86 on May 1, was in town for a celebration of 50 years of

manned spaceflight and the 86th birthday of Cocoa Beach. Later, he was to head to Kennedy Space Center for the induction of two more astronauts into the U.S. Astronaut Hall of Fame. Carpenter laughed when told that 1925, the year he was born, was the same year Cocoa Beach was established. Members of Cape Kennedy Corvette Club, a group established in 1967, escorted almost two dozen astronauts or their family representatives -- including Shepard's daughter, Laura Shepard Churchley -- in club members' cars. They "launched" at 9:34 a.m., the same time Shepard, one of the Mercury 7, became the first American to fly in space May 5, 1961. Hundreds of onlookers erupted in cheers every time an astronaut went past. Edgar Mitchell. Fred Haise. Two-time shuttle pilot Susan Still Kilrain, who shouted, "Girl power," to a young woman who called out, "You go, girl." And they talked Cocoa Beach history, remembering a day when astronauts could be found hanging out and dining at now-late but then-great landmarks: Bernard's Surf, mentioned on the 1960s TV show "I Dream of Jeannie," set in Cocoa Beach. The Mousetrap. Ramon's Restaurant. John and Pat Neilon watched the parade from a shaded area near the fire station. The two moved to Cocoa Beach in 1957 from Washington, D.C., for his job with Vanguard. They still live in the home they built on the beach. The 82-year-old retired director of unmanned launch operations, worked at Kennedy Space Center until 1986. "I wish we could keep the program going, but if you look at the shuttles, they were built in the 1970s," he said. "They're old technology, old engineering. Hopefully the commercial aspect will pick up . . . and then, I think, the program will truly have matured." The Corvette connection was established early. Alan Shepard brought along his 1957 Corvette when he reported for astronaut training in 1959 as one of the original Mercury 7. Chevy offered each astronaut a 1962 model back in the day when government ethics rules were more relaxed. Six accepted, with John Glenn opting for a station wagon instead. Suzan Cooper, widow of Mercury 7 astronaut Gordon Cooper, rode in a bright-red 1962 Corvette driven by Brevard County native Jeff Cervenka. Her husband loved Cocoa Beach, she said. She recalled dining at Bernard's Surf, which later became The Surf and closed in 2010. "The feeling is still the same here, the ambience; so many wonderful memories and people," she said. "Gordon was such a patriotic person," she said. "I think he would be delighted, seeing everyone here and nationwide, remembering the work he and the others did for their country." Web posted. (2011). [Astronaut parade heralds heroes [Online]. Available WWW: http://www.floridatoday.com/ [2011 May 8].]

**Two join Astronaut Hall of Fame**

As the strains of the late-1960s hit "Spirit in the Sky" swelled from speakers, more than a dozen members of the U.S. Astronaut Hall of Fame walked briskly to the stage at the Kennedy Space Center Visitor Complex. An hour later, as a crowd of about 500 cheered, two inductees took their places Saturday among the unique band of American explorers. Karol "Bo" Bobko, a retired U.S. Air Force colonel, and Air Force Maj. Gen. Susan Helms, a five-time shuttle astronaut, were surrounded by other Hall of Famers, including Kennedy Space Center Director Robert Cabana, Fred Haise, the lunar module pilot on Apollo 13, Col. Al Worden, an Apollo 15 veteran and Scott Carpenter, one of the Mercury 7 astronauts. Saturday's ceremony brought the number of hall members to 79. Worden praised the "cool head" and calm demeanor of Bobko, a member of the first graduating class of the Air Force Academy. Bobko, who spent 19 years in the astronaut program, was the pilot of the first voyage of shuttle Challenger. NASA Administrator Charles Bolden, inducted into the Hall in 2006, said it was his "honor and privilege to present my hero and my friend," as Helms came forward to have her Hall of Fame medallion placed around her neck. Helms, former commander of the 45th Space Wing at Patrick Air Force Base, thanked crew members and staff she has worked with over the years, saying of the crews, "I drew more from them than they ever drew from me." The record holder for longest spacewalk, Helms spent 12 years with NASA. Web posted. (2011). [Two join Astronaut Hall of Fame [Online]. Available WWW: http://www.floridatoday.com/ [2011 May 8].]

**May 9:** **NASA confirms May 16th launch date for Endeavour**

NASA shuttle managers announced Monday that they have completed repairs to the shuttle Endeavour and set May 16th as the new launch date for the penultimate shuttle mission. Endeavour had been set to launch on April 29th on mission STS-134, but the launch was scrubbed several hours before launch when heaters in one of the orbiter's three APUs failed to turn on. The problem was later traced to a failure in a power controller box in the orbiter, which was replaced last week. Managers said while they could not track down the root cause for the failure, they have replaced all the components involved in the failure and tested that they are working. The launch is now scheduled for 8:56 am EDT (1256 GMT) Monday. Those delays have also pushed back the final shuttle mission, STS-135, from late June to early to mid-July, although no new launch date for that mission has been set. Web posted. (2011). [NASA confirms May 16th launch date for Endeavour [Online]. Available WWW: http://www.spacetoday.net/ [2011 May 10].]

**More jets on the way**

A company that performs supersonic high-altitude instrument tests in vintage jet fighters will add five more aircraft to its fleet of four F-104s that fly from the Shuttle Landing Facility at Kennedy Space Center. Purchased from the Italian Air Force, the aircraft will arrive next month. "The big thing is that these are a newer generation aircraft, vintage 1980," Starfighters Inc. President and Chief Pilot Rick Svetkoff said. "They were the last ones off the assembly line." The company makes its home in the 10-year-old Reusable Launch Vehicle Hangar beside the 15,000-foot shuttle landing runway. The F-104 jets can fly above 70,000 feet at twice the speed of sound. NASA and commercial space companies have used the four Starfighters to test high-performance equipment used on the space shuttle, as well as telemetry equipment and a new digital camera. The company also has made several flights to test GPS tracking equipment. To bring Starfighters and its jobs to KSC, the state agency Space Florida invested $1.8 million in a fire suppression system for the 50,000-square-foot hangar so the fueled jets could be stored there. However, it took Starfighters nearly three years to meet NASA requirements to do business at the space center. The planes are grounded around the time of shuttle launches and landings. However, those conflicts arise only several days a year and will not be a problem after the shuttle stops flying. Bringing the planes to the U.S. and preparing them for flight will cost about $1 million per plane, rivaling their price tag. As the shuttle program ends, the commercial space industry has become more interested in testing space hardware. Web posted. (2011). [More jets on the way [Online]. Available WWW: http://www.floridatoday.com/ [2011 May 9].]

**Japanese movie crew will film at Brevard sites in June**

A Japanese film crew will be at Kennedy Space Center and other Space Coast locales in June to film scenes for a full-length action movie that already is drawing buzz in Asia. "Space Brothers" will put a popular manga series of comic books on film for the first time. The Japanese crew was in Brevard County in February and April, scouting out locations and doing secondary filming. They will be back in June to film with the stars of "Space Brothers" and a group of local acting extras. "It's been great," said Yoshi Hosoya, who is the U.S.-based producer for the project. "People have been very helpful." The live-action film will tell the story of two brothers who make a pact when they are ages 12 and 9 to become astronauts. The younger brother, Hibito Namba, reaches the goal, and in 2025 is about to become the first Japanese astronaut to land on the moon. But his older brother, Mutta Namba, becomes an autoworker who still lives with his parents when he is in his 20s. He gets fired from his factory job after an argument, then picks up on his dream to become an astronaut. The comic book characters have spun off action figures and other collectibles. The "Space Brothers" film will be produced and distributed by Toho Studios, among the largest film companies in Japan, and perhaps best-known in the United States for its series of Godzilla movies. Toho said it beat out more than 20 other movie studios and television stations for the project. Release in Japan is expected next spring. Web posted. (2011). [Japanese movie crew will film at Brevard sites in June [Online]. Available WWW: http://www.floridatoday.com/ [2011 May 9].]

**Florida Legislature Delivers $43+ Million for Space Industry**

Aerospace-related economic development played a significant role in the 2011 Florida Legislative Session, with more than $43 million being committed for growth of the industry in the coming year. Governor Rick Scott laid out an aggressive plan, not only for Florida's overall economy, but for Florida's space industry in particular, and that plan was formalized by the Legislature. The Florida Legislature, led by Senate President Mike Haridopolos (R-Melbourne) and Speaker of the House Dean Cannon (R-Winter Park), appropriated approximately $10 million to Space Florida. This was done for the purposes of recruiting new business, expanding existing business, and creating jobs during this critical time in Florida. Space Florida worked with the Legislature and the Florida Department of Transportation (FDOT) to secure $16 million in infrastructure funding for launch support facilities. This $16 million comes from the State Transportation Trust Fund and is to be used to improve launch complex and additional spaceport infrastructure at Kennedy Space Center and Cape Canaveral. This bill includes $10 million in space business tax credits both to enable the state to attract new and expand exiting space-related businesses. Specifically, the bill includes corporate income tax credits and transferrable net operating loss tax credits. Web posted. (2011). [Florida Legislature Delivers $43+ Million for Space Industry [Online]. Available WWW: http://www.spaceref.com/ [2011 May 9].]

**Final shuttle mission unlikely to fly until mid-July**

Endeavour's final blastoff is set for 8:56 a.m. next Monday, while the last shuttle mission -- by Atlantis -- is likely to slip to mid-July, NASA officials said Monday. Endeavour is back on track for launch after about 10 days of troubleshooting and repairs that followed a scrubbed attempt April 29. Although managers haven't pinpointed the exact cause of an electrical short that kept a set of fuel line heaters from turning on, they're confident they've taken the steps necessary to prevent a repeat failure. "We know we have really good power heading out to those heaters," said Mike Moses, the shuttle launch integration manager. "We have very high confidence that nothing's going to happen." The delay in the 16-day mission to the International Space Station has pushed back the timing of Atlantis' launch, which had been targeted for June 28. NASA won't set a new target date until after Endeavour is off the ground, but the second week of July is now the approximate timeframe -- squashing speculation that the launch would be timed to the July 4 holiday. The delay likely means a couple extra weeks of work for thousands of shuttle contractors whose jobs are set to end after Atlantis returns home and the shuttle program is retired. Most of those layoffs were planned for mid- or late-July based on a June 28 launch, but will push back along with the mission to ensure the necessary personnel are in place. Still, lead shuttle contractor United Space Alliance plans to send out 60-day notices this week alerting employees they are candidates for layoff when the time comes. During the Mother's Day weekend, teams worked around the clock to complete repairs and tests to verify Endeavour's fuel line heaters were back up and running. In the back end of the orbiter at launch pad 39A, shuttle electricians routed roughly 20 feet of new wiring between the heaters and a power distribution box, bypassing suspect wires. The briefcase-sized box and some thermostats were also replaced after the failure, so managers believe they've eliminated the potential causes of the electrical problem and have sufficient rationale to proceed with a launch. Recently reviewed data suggested the culprit might be a current spike during a thermostat test last June, an issue the new wiring would have resolved. "Endeavour's looking good," said Mike Leinbach, the shuttle launch director. "Hopefully, this time the heaters will work and we'll be able to launch on time next Monday." Web posted. (2011). [Final shuttle mission unlikely to fly until mid-July [Online]. Available WWW: http://www.floridatoday.com/ [2011 May 10].]

**May 10: STS-135: KSC realign schedule targets for a preliminary July 12 launch**

Kennedy Space Center (KSC) engineering teams have realigned processing targets for STS-135 to point towards a July 12 launch date. The preliminary target is dependent on numerous – and upcoming – factors, not least the need for Endeavour to launch on her re-planned May 16 date, but also a nominal pad turnaround and a smooth pre-launch flow for Atlantis herself. Atlantis now finds herself patiently sat on

the Orbiter Transporter System (OTS) waiting to roll over to the Vehicle Assembly Building (VAB) for mating operations. However, that wait will last until at least next Wednesday, following the realigned schedules relating to Endeavour's latest launch date target. De-conflicting milestones between the two orbiters has resulted in a fluid schedule for STS-135, although Atlantis is currently expecting to begin her final short trip to the VAB with two day's worth of separation from her younger sister's final ride into space. "OV-104 (OPF Bay 1): Final landing gear retract was completed on Monday. Hydraulic hose demates and securing and 1660 box disconnect and stow is complete. This marks the last planned OTS mate for the program," noted the latest processing report (L2) from the NASA Test Director (NTD). "Rollover to the VAB is under review; targeting NET (No Earlier Than) 5/18. Internal schedules are continuing to be realigned, to the point that July 4 was periodically targeted as Atlantis' latest launch date, prior to the latest assessment being produced – based on Endeavour launching on May 16 – via what is known as the Ops Forecast. Based on Tuesday's updated Ops Forecast schedule, STS-135 will enter S0007 Launch Countdown operations on July 9, ahead of a launch date target of July 12. Web posted. (2011). [STS-135: KSC realign schedule targets for a preliminary July 12 launch [Online]. Available WWW: http://www.nasaspaceflight.com/ [2011 May 10].]

**KSC chief shares employment optimism**

The number of jobs at Kennedy Space Center will fall to about 8,000 this year, then will begin to grow by as many as 2,000 jobs spanning several years as new programs are created, KSC Director Bob Cabana said Tuesday before the National Space Club. "If we really do this right, we'll get back to where there are 10,000 contractors and civil servants," Cabana said at the group's monthly meeting. The former U.S. Marine Corps pilot has flown four shuttle missions, two as commander. He now has the responsibility of leading KSC during the uncertain transition of the shuttle program to a new spacecraft. Crew capsules are under design by several companies, and Cabana said that in July NASA will announce the architecture of the next rocket that will carry humans beyond low-Earth orbit, either to Mars or an asteroid. "It will be sustainable, and it will be bought into by Congress," Cabana said. "I don't see any more budgets cuts coming." The Obama administration's 2012 budget contains $2 billion for new projects at KSC. Budget negotiations in Washington, D.C., however, are uncertain. Cabana's speech at the Radisson Resort at the Port met with silence from the audience of several hundred space industry officials and employees. After the final two shuttle launches, scheduled for Monday and mid-July, as many as 8,000 space workers will have lost their jobs. The number of NASA workers at KSC will remain at about 2,000, with no layoffs planned, though there will be a slight reduction in numbers due to attrition, Cabana said. Cabana said that until the next NASA rocket launches, workers at KSC will refurbish launch pads to attract commercial flights and the heavy-lift rocket, and will focus on science projects for the International Space Station. "It's going to be difficult, but we're pulling together a master plan," Cabana said. "We have to make these changes regardless of what the next vehicle is. We're not going out of business. We've got a lot of great work coming our way." Web posted. (2011). [KSC chief shares employment optimism [Online]. Available WWW: http://www.floridatoday.com/ [2011 May 10].]

**Lift off: NASA security director talks about securing Endeavour**

In just a few days, the second-to-last shuttle, Endeavour, is expected to launch from Kennedy Space Center here at NASA headquarters in Florida. After the first launch attempt was scrubbed on April 29 due to a system failure in the shuttle's heater system, Endeavour is scheduled to launch on May 16, to complete a 16-day mission to deliver spare parts and a science instrument to the International Space Station. Security Director News had the opportunity to visit the launch site and speak with NASA's security director about the unique challenges in protecting the shuttle during a launch. One of the most important components of securing the shuttle and the 144,000 acres of property at Kennedy Space Center is collaborating with local and federal entities, said Mark Borsi, security director of NASA protective services branch. Borsi is charged with dealing with any threats made to the shuttle program. "It is of vital importance to cooperate with state and federal groups," he said. Borsi partners with everyone from local law enforcement to the FBI, the Joint Terrorism Task Force, U.S. Air Force and U.S. Coast Guard to

secure the premise and communicate any threats that may impact the shuttle launch. He's no stranger to high-security measures. Borsi spent 13 years with the U.S. Department of Defense focusing on counter intelligence efforts. He joined the Kennedy Space Center in 2002 to help establish a special access and counterterrorism division. Working with other agencies is critical to protecting its assets, however, the NASA security team must also be extremely self-reliant and prepared to deal with any situation. "We rely on the surrounding community, but keep in mind emergency response is 30 or 40 minutes away, same with armed response," he said. Therefore, NASA has specialized agents, many former high-level law enforcement officers. The space center has 150 uniformed security police officers, along with its own fire department and emergency management teams. "We have a lot of dangerous stuff in our buildings, so to rely on external people to respond or resolve critical security issues would be foolhardy," Borsi said. Preparing for a shuttle launch presents unique security issues for KSC. Borsi said the security team has devised an elaborate and detailed contingency plans relating to the launch. "We plan not only 'A', 'B', and 'C' but well into 'D' and 'E', and we practice those plans," he said. As launch day approaches, the security team prepares for guests, begins canine sweeps of the property and operational areas. "The launch control center is our most critical facility, so that is swept, cleared and protected with armed personnel," he said. They also push perimeter gates out, restricting access to KSC. In addition, the astronauts are closely monitored and protected as well. If they go jogging, for example, a member of the security team will escort them to ensure their safety. The security team is in constant communication with the launch team and confirms the completion of each task of its shuttle launch security plan. The shuttle launch security plan details every individual's job and specifies what time and in what order each task must be completed. "We report to the NASA launch team in the countdown process that steps are completed," he said. During this time, security crews are also protecting and monitoring activity of crowds of people gathered to watch the launch. "On the causeway, where there is the largest number of guests, because cars are not screened there, canine units go through crowds checking people and vehicles," he said. One of the biggest challenges during a launch is managing all the spectators, who can cause major traffic congestion and cause a serious public safety issue, Borsi said. He estimated that in addition to the 50,000 people at KSC, there are 500,000 viewers lined up along roadways watching the launch. Borsi said people fill roadway medians to get a good view of the launch pad. The influx of people is less of a concern than the fact that minutes after the shuttle launches and is out of sight, everyone wants to leave at the same time. KSC works closely with the highway patrol and provides them with mission briefings and tasking requirements. Helicopters serve dual purpose in clearing airspace as well as monitoring traffic from the air. There is also a state-of-the-art emergency operations center at KSC, which is capable of running the entire county, if need be, Borsie said. The control center monitors all fire and security alarms as well as coastal radar to help the U.S. Coast Guard make sure there are no intruding boats in the launch area. The death of Osama bin Laden, coupled with the upcoming launch, has heightened security at KSC. Security officers are conducting more physical and canine checks and have increased their presence in visitor centers and other areas of the property. "We're showing a more visible presence and will do so until after the launch," Borsi said. On top of an already high-security event, launches often include a Presidential visit. This "super special event" involves even more personnel and further coordination with the Secret Service. For the scrubbed launch in late April, there were approximately 55 Secret Service agents also securing the premise. Borsi said the Presidential visit is actually less stressful than the launch, although it can cause distractions because the Secret Service has additional requirements than regular launch plans, including closing down and blocking certain hallways surrounding the President. "We try to limit anything that take away from shuttle safety," he said. Web posted. (2011). [Lift off: NASA security director talks about securing Endeavour 'We plan not only 'A', 'B', and 'C', but well into 'D' and 'E', and we practice those plans' [Online]. Available WWW: http://www.securitydirectornews.com/ [2011 May 10].]

**May 11: NASA Invites Reporters To Second Annual Lunabotics Competition**

Forty-six teams of undergraduate and graduate students from the United States, Bangladesh, Canada, Colombia and India will participate in NASA's Lunabotics Mining Competition May 26 - 28 at the agency's Kennedy Space Center in Florida. The competition's opening day from 10 a.m. to 2 p.m. EDT at

the Kennedy Space Center Visitor Complex. The student teams have designed and built remote controlled or autonomous robots that can excavate simulated lunar dirt. During the competition, the teams' designs, known as lunabots, will go head-to-head to determine which one can collect and deposit the most simulated lunar dirt within 15 minutes. The event is designed to engage and retain students in the science, technology, engineering and math, or STEM, disciplines critical to NASA's missions. Web posted. (2011). [NASA Invites Reporters To Second Annual Lunabotics Competition [Online]. Available WWW: http://www.spaceref.com/ [2011 May 11].]

**Tests On Spare Shuttle Switching Box Complete**

NASA is pressing ahead with preparations to pick up a second Endeavour launch countdown after finishing up all retesting on a spare power switching box installed after hydraulic power unit heater failures prompted an April 29 launch scrub. Mission commander Mark Kelly and five crewmates, meanwhile, are taking part in a review of procedures for the final four spacewalks planned during the 30-year-old shuttle program. The astronauts will fly to KSC early Thursday. Their ETA: 9 a.m. NASA contractor technicians installed the spare power switching box in the aft engine compartment of Endeavour after two Auxiliary Power Unit heaters failed during countdown to an April 29 launch. NASA engineers thought a short within the original power switching box might have prevented power from reaching the heaters. The heaters keep hydrazine lines at the proper temperature in orbit. A frozen power line could cause a flammable hydrazine leak. The power switching box routes electricity to nine critical shuttle systems, including the solid rocket boosters, main engines and life support systems. So a good deal of testing had to be performed after the box swap to make sure the spare is routing electricity to each of the nine systems. That work started last week and was completed late Tuesday. Endeavour's launch now is scheduled for 8:56 a.m. Monday. A three-day countdown is slated to pick up at 7 a.m. Friday. External tank propellant-loading operations are scheduled to begin at 11:36 p.m. Sunday. Web posted. (2011). [Tests On Spare Shuttle Switching Box Complete [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 May 11].]

**May 12: Astronauts return to Cape for Monday's shuttle launch**

After extensive troubleshooting and repairs to fix an electrical problem with the shuttle Endeavour's hydraulic power system, commander Mark Kelly and his five crewmates flew back to Florida Thursday to prepare for a delayed launch Monday on a long-awaited space station assembly mission, the orbiter's 25th and final flight. The countdown is scheduled to begin Friday morning, setting up a launch attempt at 8:56:26 a.m. EDT (GMT-4) Monday. Forecasters are predicting a 70 percent chance of good weather. Hoping for the best, Kelly, pilot Gregory H. Johnson, Michael Fincke, Gregory Chamitoff, Andrew Feustel and European Space Agency astronaut Roberto Vittori landed at the Kennedy Space Center's shuttle runway aboard a NASA training jet shortly after 9 a.m. after a flight from Houston. Endeavour was grounded April 29 when hydraulic system fuel line heaters failed to activate as required when the shuttle was being fueled for launch. Extensive troubleshooting revealed blown fuse elements on a power switching circuit card inside an engine compartment avionics box packed with electrical distribution gear. Engineers have been unable to find the short that caused the fuse to blow, but the box was replaced, along with thermostats and the power line between the box and the heaters. The system worked normally in a battery of tests and engineers are confident the heaters will operate as required when Endeavour is loaded with supercold propellants Monday, subjecting the hydraulic system fuel lines to low temperatures. Engineers plan to start Endeavour's countdown at 7 a.m. Friday. Liquid oxygen and hydrogen will be pumped aboard Saturday to power the ship's three electricity producing fuel cells and a protective gantry will be pulled away from the ship Sunday at noon, exposing the orbiter to view and clearing the way for fuel loading. The three-hour fueling procedure is scheduled to get underway around 11:36 p.m. Sunday. If all goes well, Kelly and his crewmates will begin strapping in at 5:41 a.m. Monday to await liftoff on the 134th shuttle mission. Web posted. (2011). [Astronauts return to Cape for Monday's shuttle launch [Online]. Available WWW: http://www.spaceflightnow.com/ [2011 May 12].]

**Mini-satellites aboard shuttle all set for trial run**

Clouds of dime-sized satellites sailing the solar wind might one day help warn of approaching sun storms that could knock out power grids. They could sprinkle onto the moon's surface, or into the atmosphere of Jupiter or Saturn to gather chemical clues about those distant worlds. Shuttle Endeavour's last flight -- set for Monday -- will deliver the first three prototypes to be mounted on the International Space Station. They're among many other experiments that will be carried to the ISS, including the $2 billion Alpha Magnetic Spectrometer-2 that has captured most of the science-related headlines as the mission approaches. Researchers want to see how the three cracker-shaped spacecraft, called Sprite, hold up and transmit data in the harshness of space. Ultimately, tens of thousands of much smaller microsatellites could be deployed simultaneously in large "swarms" to explore new worlds on their own. The chips' tiny size enables them to travel like space dust, riding solar winds, without fuel. The Sprite chips will be mounted to the Materials International Space Station Experiment (MISSE-8) pallet, a test bed for materials and computing elements outside of the space station. Web posted. (2011). [Mini-satellites aboard shuttle all set for trial run [Online]. Available WWW: http://www.floridatoday.com/ [2011 May 12].]

**NASA Moves To Add Delta 2 Rocket Back to List of Available Launchers**

NASA and Denver-based United Launch Alliance (ULA) are negotiating to add the Delta 2 medium-class rocket to the agency's list of available launch vehicles capable of lofting small- to intermediate-sized science payloads to orbit. "ULA has indicated to NASA it is interested in on-ramping the Delta 2," NASA spokeswoman Stephanie Schierholz said in a May 12 email response to questions. Schierholz said the agency could add the Delta 2 this summer to NASA's recently negotiated launch services contract, a roster that includes eight U.S.-made launch vehicles capable of delivering between 175 and 14,280 kilograms to orbit. However, "NASA may accelerate the start of the on-ramp period to better distribute launch services program resources during the summer/fall timeframe," Schierholz said. Since 1998, NASA has relied on the Delta 2 rocket to carry almost 60 percent of its scientific satellites into orbit, according to a November 2010 report by the U.S. Government Accountability Office (GAO), "NASA: Medium Launch Transition Strategy Leverages Ongoing Investments but is Not Without Risk." Delta 2, however, is no longer in production, and just five of the rocket's heavy variant remain in ULA's inventory, while "no other vehicle in the relative cost and performance range is currently certified for NASA use," the GAO report states. NASA's plan to phase out Delta 2 stemmed from a decision by the U.S. Air Force to end its use of the rocket in 2009, leaving NASA to foot the bill for maintaining the launch vehicle's infrastructure. Instead, NASA opted to bet on development of new commercial launchers to fill the void, including the Falcon 9 rocket built by Space Exploration Technologies Corp. of Hawthorne, Calif., and Dulles, Va.-based Orbital Science Corp.'s new Taurus 2 rocket, two launch vehicles with lift capabilities similar to the Delta 2. However, it takes approximately three years for a new launch vehicle to be certified by NASA's Launch Services Program, a process that generally does not begin until the vehicle has been selected by the space agency for a particular mission, according to the GAO. In the meantime, NASA has few reliable options for launching small-to-medium-sized science payloads in the coming years. Orbital's Taurus XL rocket, a ground-launched version of its highly reliable air-launched Pegasus vehicle, has sent two of NASA's Earth science payloads into the Pacific Ocean over the past two years due to a faulty payload fairing. The most recent mishap, which resulted in the loss of NASA's climate-monitoring Glory spacecraft during a March 4 launch attempt from Vandenberg Air Force Base, Calif., is currently under review by an accident investigation board that is not required to complete its work before Sept. 6, NASA spokesman Stephen Cole said May 11. A similar Taurus XL mishap occurred in February 2009 when the rocket failed to launch NASA's Orbiting Carbon Observatory (OCO), a satellite built by Orbital Sciences to measure the Earth's greenhouse gas emissions. NASA spent four months investigating the mishap and another year-and-a-half implementing corrective actions prior to the Glory launch, Schierholz said. "What will need to be done this time will depend in large part on the findings and recommendations of the Mishap Investigation Board," she said. Ed Weiler, head of NASA's Science Mission Directorate, said he will not fly another payload atop a Taurus XL

rocket until NASA recertifies the vehicle. In April the agency stopped payments on a Taurus XL launch vehicle contract with Orbital Sciences for a February 2013 re-flight of the OCO satellite, dubbed OCO 2. "Atlas 5s are being priced out of our range," Weiler said. "This is now starting to affect all of our missions." Adding ULA's remaining five Delta 2 rockets to NASA's launch contract could allow the agency to keep OCO 2 on track. Web posted. (2011). [NASA Moves To Add Delta 2 Rocket Back to List of Available Launchers [Online]. Available WWW: http://www.spacenews.com/ [2011 May 16].]

**Heavy-duty heat shield prepares for launch to Mars**

A massive carbon-covered heat shield, one of the largest ever built for space travel, is now at the Kennedy Space Center being readied for launch on NASA's next mission to Mars. The heat shield and associated aerodynamic shell will help shepherd NASA's nearly $2.5 billion Mars Science Laboratory mission from space to a gentle touchdown on the Red Planet's surface. The centerpiece of the mission, a six-wheeled rover named Curiosity, will drive around Mars for at least two years studying the planet's archive of organic compounds, climate and geology to determine whether it was ever capable of supporting microbial life. The mission's 15-foot-wide heat shield and aerodynamic shell touched down at KSC's space shuttle runway inside a U.S. Air Force C-17 cargo plane May 12, and then workers trucked the hardware to a nearby clean room overnight, according to George Diller, a NASA spokesperson. Manufactured by Lockheed Martin Corp. in Denver, it's the largest heat shield ever designed for flight through the Martian atmosphere. It's also wider than the blunt side of the Apollo command module, making the MSL heat shield the largest to ever fly on a capsule-shaped craft in space. "It's almost 15 feet across," said Bill Willcockson, a Lockheed Martin entry systems engineer. "That's enormous." Covered with a one-inch coating of special carbon ablator, the aeroshell will take the brunt of the loads as the rover descends to the Martian surface. Temperatures will soar to 3,300 degrees Fahrenheit as friction builds on the saucer-shaped craft, according to Lockheed Martin engineers. The wind-facing heat shield will absorb most of the blazing temperatures, leaving the underlying aluminum honeycomb and graphite epoxy structure at a relatively comfortable 400 degrees Fahrenheit. The ballistic coefficient, a function of mass, diameter and drag, is a measure of how well an object overcomes air resistance in flight. The Mars entry vehicle's high ballistic coefficient number means it loses velocity slowly when encountering the planet's thin atmosphere. The mission's biscuit-colored heat shield will discharge most of the probe's approach velocity, slowing the craft to about 1,000 mph for the deployment of a supersonic parachute. More than 100 blocks of Phenolic Impregnated Carbon Ablator, or PICA, are attached to the aeroshell. Each of the PICA tiles has a specific shape for a certain place on the entry craft, according to Rich Hund, Lockheed Martin's MSL program manager. The shape of the aeroshell's curve is asymmetric, giving the craft the ability to generate modest lift and glide through the Martian atmosphere. The vehicle will control its trajectory through a series of roll maneuvers. The extra rigor of MSL's atmospheric entry means the heat shield will be subjected to more heat, stress and a turbulent flow of plasma across its flush surface. The heat shield will be subjected to about 105,000 pounds of compressive force across its surface, causing the structure to deflect with bending and shear loads more severe than other missions experienced, according to Lockheed Martin. The Mars Science Laboratory's attention-grabbing size and hefty payload necessitated the costliest and most robust spacecraft, heat shield and rover to ever fly to the Red Planet. Web posted. (2011). [Heavy-duty heat shield prepares for launch to Mars [Online]. Available WWW: http://www.spaceflightnow.com/ [2011 May 18].]

**May 13: Countdown begins anew for shuttle Endeavour's launch**

Engineers restarted the shuttle Endeavour's countdown Friday, setting the stage for a delayed launch Monday on a flight to deliver supplies, spare parts and a $2 billion particle physics detector to the International Space Station. There are no technical problems of any significance at pad 39A and forecasters are predicting a 70 percent chance of good weather. "We're counting and working on some of our avionics checkouts right at the beginning of the count as we normally do," said NASA Test Director Jeff Spaulding. "I am really proud of our teams working so hard over the last couple of weeks. They have done an outstanding job to get us ready for this launch on the historic and final flight of space shuttle

Endeavour." Working in Firing Room No. 4 at the Launch Control Center 3.4 miles from pad 39A, engineers started Endeavour's countdown at 7 a.m. EDT Friday. Liquid hydrogen and oxygen will be pumped aboard to power the shuttle's electricity-producing fuel cell system Saturday. A protective gantry is scheduled to be pulled away from the shuttle at noon Sunday, exposing the ship to view and setting the stage for fueling. If all goes well, the three-hour fueling procedure will begin at 11:36 p.m. Sunday and Endeavour's crew -- commander Mark Kelly, pilot Gregory H. Johnson, Michael Fincke, Gregory Chamitoff, Andrew Feustel and European Space Agency astronaut Roberto Vittori -- will begin strapping in around 5:41 a.m. Monday to await liftoff. Shuttle weather officer Kathy Winters said forecasters are predicting a 70 percent chance of acceptable weather Monday with the primary concerns being slightly high crosswinds at the shuttle's emergency runway. The odds drop to 60 percent "go" on Tuesday and improve to 80 percent favorable on Wednesday. Winters said the timing of a trough expected to move through the area Sunday could bring afternoon storms and cause problems for engineers trying to move the gantry away from the space shuttle. But she said the system was expected to clear out in time for fueling and launch. NASA attempted to launch Endeavour on its 25th and final flight April 29, but the countdown was called off when engineers were unable to activate a "string" of hydraulic system fuel line heaters used by auxiliary power unit No. 1. Extensive troubleshooting and analysis showed the problem likely involved a power switching circuit in an avionics box known as an aft load control assembly, one of three in the shuttle's engine compartment. Web posted. (2011). [Countdown begins anew for shuttle Endeavour's launch [Online]. Available WWW: http://www.spaceflightnow.com/ [2011 May 13].]

**Job cuts pose challenges as shuttle program winds down**

Kennedy Space Center's shrinking shuttle workforce is looming larger in the program's final days. Repairs like those Endeavour needed after its April 29 launch scrub pose a greater challenge with fewer workers available and managers careful not to overtax them. And launch of the final shuttle mission is slipping into July in part because remaining crews can't perform as many major operations simultaneously or without interruption. Atlantis' move to the Vehicle Assembly Building to be joined with an external tank and boosters, for example, has had to wait while teams are tied up with Endeavour's preparations for its 8:56 a.m. EDT Monday launch. "We're being affected by our workforce reductions," said Mike Moses, NASA's shuttle launch integration manager. "In the past, we would have had extra teams to be able to help with that."Even as the countdown began Friday for Endeavour's last launch, planning for the biggest workforce reduction yet marched forward. Lead shuttle contractor United Space Alliance this week sent 60-day notices of potential layoffs to roughly 1,900 local employees. Most of the layoffs are expected to take effect July 22, though the exact timing depends on when Atlantis launches the 135th and final mission of the three-decade shuttle program. Kennedy's total contractor workforce, including non-shuttle workers, now numbers 8,900, down from about 13,000 two years ago. Across the country, the shuttle program has dropped from 14,000 contractors in late 2006 to about 5,500 today, a 60 percent decline. NASA and its contractors have closely monitored the downsizing to ensure critical skills were retained and missions flown safely. Other than some launch delays that are not uncommon in shuttle program history, recent missions have been praised as largely problem-free. Monthly meetings assess staffing resources across every work group, from engineers and technicians to safety and quality inspectors. "I feel good about it," Shuttle Launch Director Mike Leinbach said. "The process works exactly right." The process was tested in recent weeks after an electrical problem scrubbed Endeavour's April 29 launch attempt. Leinbach said the engineering group responsible for the shuttle's hydraulic power system, where the problem was located, was slightly understaffed, requiring creative scheduling to accomplish "a heck of a lot of work" around the clock. But he said managers took pains to make sure crews received enough rest and would speak up if they had concerns. Web posted. (2011). [Job cuts pose challenges as shuttle program winds down [Online]. Available WWW: http://www.usatoday.com/ [2011 May 13].]

**USA sends out notices for final shuttle layoffs**

As Endeavour counts down to its final launch on Monday morning, shuttle contractors are marching forward with plans for layoffs that will accompany the program's end this summer after two more flights. Lead shuttle contractor United Space Alliance this week sent out notices to roughly 1,900 local employees likely to be laid off in July and August, the company confirmed. The 60-day notices are required by law under the federal WARN Act. The final tally could be slightly lower. Houston-based USA announced its plans for end-of-the-shuttle-program cuts a month ago. They're expected to total about 2,800 jobs -- half the company -- including about 850 positions in Texas and 50 in Alabama. USA now employs about 3,300 at Kennedy Space Center. Among other large contractors involved in processing the shuttle or its payloads, The Boeing Co. expects to let go about 310 of its 750 KSC employees after the last mission this summer. Web posted. (2011). [USA sends out notices for final shuttle layoffs [Online]. Available WWW: http://www.floridatoday.com/ [2011 May 13].]

**May 15: NASA's $10B rocket plan recycles shuttle parts, draws flak**

NASA's latest plan to replace the space shuttle would spend at least $10 billion during the next six years to test-fly a rocket made of recycled parts of the shuttle — with no guarantee the rocket would ever be used again, according to documents obtained by the Orlando Sentinel. NASA is proposing a so-called "shuttle-derived test flight campaign" to provide the agency with a rocket it can use to test its nascent crew capsule — and keep shuttle workers and the aerospace industry busy — while the agency figures out what it really wants in a next-generation "heavy-lift" rocket that could go to the moon or beyond. But critics are already deriding the plan as "a rocket to nowhere" that would pay billions to the aerospace industry to perpetuate the use of 30-year-old shuttle technology while further postponing resolution of a fundamental question: What's the mission of NASA's human-spaceflight program? "What we seem to have is a desire to spend money on rockets in the hopes that we will develop a mission one day," said Jeff Greason, member of the 2009 presidential committee that looked at the future of U.S. human spaceflight. But for NASA, the plan has the merit of being a cheap — even at $10 billion through 2017 — and easy answer to a congressional mandate to quickly build a rocket out of parts used on the shuttle or developed for the now-defunct Constellation moon-rocket program. As designed, the test rocket would keep the shuttle's orange fuel tank and twin white boosters, and replace the planelike orbiter with Orion, an Apollo-like crew capsule, atop the external tank. Three of the engines now used by the orbiter would be added at the base of the tank for extra lift. "Shuttle-derived architecture consistently provides early, highly capable solution," wrote NASA officials in a brief to Congress. It would also provide billions more to ATK of Minnesota, which makes the solid-rocket boosters, and Lockheed Martin, which in addition to the Orion capsule would also manufacture the new rocket's fuel tank. Both were prime contractors for Constellation, which was canceled by the White House and Congress last fall because it was years behind schedule and over budget. The test rocket is similar to a design proposed three years ago by NASA engineers seeking an alternative to Constellation. But the engineers, working on their own time, were given short shrift by agency officials committed to designing and building a brand-new rocket. NASA's former head of space exploration told Congress that the idea "defied the laws of physics." Now, NASA is saying that test flights of Orion and this recycled shuttle stack could start as early as 2013, and one NASA document indicated they could last until as late as 2019. For its part, NASA has said nothing is decided. Among the other possibilities still under review, he wrote: a revamped military rocket or a new liquid-fueled rocket. But a shuttle-derived decision remains the favorite ever since lawmakers and Obama agreed last year on a NASA blueprint that required the agency to attempt to use existing shuttle and Constellation parts when building the heavy-lift rocket. Web posted. (2011). [NASA's $10B rocket plan recycles shuttle parts, draws flak [Online]. Available WWW: http://www.orlandosentinel.com/ [2011 May 15].]

**Giffords at KSC to watch husband Kelly's launch**

U.S. Rep. Gabrielle Giffords, the wife of Endeavour commander Mark Kelly, has arrived at Kennedy Space Center to watch Monday morning's launch, her staff has reported. "Thanks to NASA for great flyby of launch pad." "Glad to have you here," KSC staff said via Twitter. Giffords was shot in the head Jan. 8

during a shooting rampage at a constituent event she was hosting outside a supermarket in her Tucson, Ariz., district. Six people were killed and 13 wounded. NASA offers all families of shuttle crews transportation to and from the launch. Giffords will not make any public appearance during her visit and her launch viewing location has not been disclosed. Her staff plans to hold a press conference after the launch. Web posted. (2011). [Giffords at KSC to watch husband Kelly's launch [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 May 15].]

**NASA: Shuttle Endeavour 'good to go' for Monday launch**

Thanks to positive results on all pre-flight checks, NASA officials on Saturday unanimously gave the go-ahead for the Monday launch of the Space Shuttle Endeavour. "The system looks good, the weather looks good, and we should be in good shape for launch," NASA Space Shuttle Program Launch Integration Manager Mike Moses told reporters Saturday. "In our minds, we are good to go." An estimated 500,000 people are expected to be on hand Monday at the Kennedy Space Center, said NASA's shuttle launch director Michael D. Leinbach. Lift-off is scheduled for 8:56 a.m. Storms rolled through Florida on Saturday, but Kathy Winters -- the space agency's launch weather officer -- said she expects conditions to gradually improve over the weekend. She said that there is a 30% chance that strong crosswinds or a low-cloud cover could force a launch delay Monday. Conditions are expected to deteriorate should the mission's start be pushed back to Tuesday, with a 60% chance of postponement. The weather is likely to improve considerably by Wednesday, according to Winters. The shuttle program's end, and the uncertainly surrounding the future of NASA and the U.S. space program, has been a hot topic in recent months. Leinbach acknowledged Saturday that "the mood is a little bit downcast" in the space agency, especially with some NASA employees getting notices this week warning them that they could lose their jobs. "The timing is a little unfortunate, but we've all known it's been coming," he said. Endeavour entered service in 1992, as a replacement for the ill-fated Challenger. Leinbach, who was a test director for that inaugural mission, said the orbiter remains in prime condition 19 years later. "She still looks awfully good out there," said Leinbach. "She's got a lot of life left in her, but that's not meant to be." Web posted. (2011). [NASA: Shuttle Endeavour 'good to go' for Monday launch [Online]. Available WWW: http://www.cnn.com/ [2011 May 15].]

**May 16: Space shuttle Endeavour begins its final mission**

After two delays covering 27 days, space shuttle Endeavour began its 25th and final flight in a stunning on-time launch on Monday from Kennedy Space Center. The 134th and second-to-the-last flight in the shuttle program was initially delayed by a traffic jam at its destination — the International Space Station — and later by electronic problems involving one of Endeavour's crucial Auxiliary Power Units. But all that was forgotten as the shuttle soared skyward from launch pad 39A, riding atop twin pillars of fiery exhaust from its solid rocket boosters and main engines. The ascent thrilled an estimated 45,000 people on the grounds of KSC and tens of thousands of spectators across the Space Coast. Its 8:56 a.m. liftoff and 8½-minute trip to orbit were breathtaking in their beauty and their power and their consequences for the nation's human space flight efforts. Only the launch of Atlantis on the 135th and final shuttle mission, scheduled for mid-July, remains before America finds itself unable to send its own astronauts into space on its own vehicles. Once Atlantis' mission is complete, the nation will depend on flights of Russian rockets to deliver astronauts to and from the International Space Station until new transport systems are built and deemed ready to fly. Endeavour and its crew of Commander Mark Kelly, Pilot Greg H. Johnson and mission specialists Michael Fincke, Andrew Feustel, Greg Chamitoff and European Space Agency astronaut Roberto Vittori are delivering a $2 billion cosmic ray detector — the Alpha Magnetic Spectrometer — to the station along with spare parts. Endeavour is set to dock at the station around 6 a.m. Wednesday. Attention will then turn to deployment of the spectrometer and the four spacewalks to be performed by Feustel, Fincke and Chamitoff, the final ones scheduled in the shuttle's 13-year history at the station. The mission, the 36th for a shuttle to the station, is set for 16 days. Undocking is scheduled for about 11 p.m. on May 29 and landing for about 2:30 a.m. on June 1 at Kennedy Space Center's Shuttle Landing Facility. The delays behind it, Endeavour's climb to orbit was

flawless, dispelling worries about the performance of its external fuel tank, the so-called "hurricane tank" and "Frankentank." The 154-foot orange fuel tank needed modifications after the 2003 Columbia disaster and repairs after sustaining non-structural damage during Hurricane Katrina in 2005. More recently, sections were reinforced as a precaution to prevent the kinds of cracks found and repaired on the previous tank flown. Also, its insulating foam suffered minor hail damage in a storm. Because the Lockheed Martin-built tank labeled ET-122 does not have all the modifications made to tanks built after Columbia, managers believed foam was expected to break away from certain areas, but late enough in flight that it would not cause damage. The launch also came days after layoff notices went out to 1,900 KSC contractors, who will be let go after Atlantis flies. Before that happens though, technicians will prepare the orbiters for their retirements. Endeavour is to be sent to California Science Center in Los Angeles, Atlantis to the Kennedy Space Center Visitor Complex and Discovery to the Smithsonian Institution's National Air and Space Museum's Steven F. Udvar-Hazy Center in Chantilly, Va. The prototype shuttle Enterprise is bound for the Intrepid Sea-Air-Space Museum in New York City. Web posted. (2011). [NASA: Shuttle Endeavour 'good to go' for Monday launch [Online]. Available WWW: http://www.floridatoday.com/ [2011 May 16].]

**Shuttle gridlock less than expected**

With crowds smaller than expected at popular North Brevard shuttle viewing sites for Monday's launch of Endeavour, traffic congestion was less than expected, too. Titusville police Lt. Todd Hutchinson said his department experienced none of the gridlock that followed the February launch of Discovery and tied up traffic leaving town for hours. "It was surprisingly light," said Hutchinson, who helped monitor traffic from his department's new mobile command center, which was parked at Sand Point Park. Initial estimates that 500,000 or more people would come to Brevard County to view Endeavour's launch Monday didn't appear to have been met, judging by impressions of observers at viewing sites in the Titusville, Cocoa Beach and Port Canaveral areas. Florida Highway Patrol spokeswoman Sgt. Kim Montes said that while traffic grew heavier along Interstate 95 and the Beachline Expressway before and after Monday's launch, it was nothing like the traffic Feb. 24, when Discovery launched, or April 29, when Endeavour's previous attempt scrubbed 31/2 hours before launch. I-95 and Beachline traffic was back to normal within three hours after launch Monday, and there were no major backups, Montes said. That contrasts with the 50-mile backup and eight hours it took for traffic to get back to normal on the Beachline after Discovery launched. Another factor mentioned is that it's harder for many to take a Monday morning off from work than it is to take a Friday afternoon off. Web posted. (2011). [Shuttle gridlock less than expected [Online]. Available WWW: http://www.floridatoday.com/ [2011 May 16].]

**Woman's otherworldly photos, video of space shuttle launch from plane**

Groggy from a late night watching the Yankees, frigid from a chilled airplane cabin, Stefanie Gordon stirred to action after the pilot's announcement. Lifting her iPhone to the plane's window, she captured an otherworldly image that rocketed around the globe as fast as her subject: Space shuttle Endeavour soaring from a bank of clouds, its towering plume of white smoke lighting the azure sky. She had never imagined the response her airborne image — capturing the last launch of Endeavour and the next-to-last space shuttle flight — would ignite. The images and video have been viewed hundreds of thousands of times on Twitter alone, landed on network newscasts and been published in newspapers worldwide. In turn, they've made a photographic celebrity of sorts of the unemployed 33-year-old from Hoboken, N.J. Gordon caught an early Delta flight from New York to West Palm Beach on Monday to visit her parents and had a whole row to herself, never imagining the history she would record. She stretched out and took a nap. Then she awoke shortly before the pilot announced the descent had begun and a sighting of the shuttle was possible. She had forgotten Endeavour was even taking off at 8:56 a.m. EDT, but readied her iPhone just in case. Then, the pilot came on again, alerting passengers the shuttle was in sight. "Everybody ran over to the east side of the plane," Gordon said Tuesday, "and all of a sudden there it was in the clouds." All told, she shot 12 seconds of footage of the shuttle arcing on its simple stream of smoke into space. She also shot three still photographs. The plane landed minutes later in West Palm Beach and

while she was waiting at the luggage carousel, at 9:31 a.m., she began uploading to Twitter. As she waited for her father to pick her up, she realized her work was making a splash. The Associated Press contacted Gordon through Facebook and purchased the images. The AP often obtains photos from eye witnesses, called citizen journalists. Web posted. (2011). [Woman's otherworldly photos, video of space shuttle launch from plane turn into an online hit [Online]. Available WWW: http://www.orlandosentinel.com/ [2011 May 16].]

**Local company played role in shuttle launch**

The space shuttle wasn't the only thing that took flight Monday morning at Cape Canaveral. In the seconds before Endeavour blasted off into space, two vultures took to the air within 200 yards of the rocket, said Ron Merritt, president of DeTect, a Panama City-based company that sold NASA radar technology to monitor avian activity in the vicinity of shuttle launches. In the minutes before the launch, four vultures apparently were rustled awake, leading to tense moments for Ron Merritt and Tim West as they spotted movement on a radar monitor while the countdown continued, Ron Merritt said. After calls from DeTect's spotters on the roof and NASA's test director, they determined about 30 seconds before takeoff the birds were not near the shuttle's trajectory and there was no reason to halt the launch, but "there was some concern," Ron Merritt said. The vultures can have a 6-foot wing span and weigh 4 to 4.5 pounds, he said. By the time the rocket is at the top of the launch pad and has accelerated to speeds of 500 mph, hitting a bird "could be catastrophic," Merritt said. The foam chunk that struck and damaged Columbia's wing in 2003 weighed 1.7 pounds. In July 2005 during the launch of Discovery, a vulture hit the shuttle's external take just after liftoff, according to NASA's website. It didn't do any damage but was enough for the agency to take action. By a launch in July of the next year, NASA obtained equipment to monitor bird activity from DeTect. The radar system is designed here by scientists and engineers, built here and operated by locals. With the Merritt Island National Wildlife Refuge near the Kennedy Space Center, bird activity is a concern. Ron Merritt said activity was monitored for several days prior to the launch by a four-person team consisting of Julie Merritt, West and Ron White. With 10 seconds left before blastoff Monday, Ron Merritt and West jumped out of their seats and ran to a fire escape to watch. But they were too late. They have pictures as souvenirs, though, complete with images of the birds that kept them from witnessing the liftoff of Endeavour's final flight. Web posted. (2011). [Local company played role in shuttle launch [Online]. Available WWW: http://www.newsherald.com/ [2011 May 16].]

**NASA Announces Its First Payloads for Commercial Suborbital Spacecraft**

NASA has announced its first four payloads to fly on commercial suborbital spacecraft, kicking off a new era of low-cost technology R&D, science, and STEM education enabled by new commercial spacecraft being developed by Armadillo Aerospace, Blue Origin, Masten Space Systems, Virgin Galactic, and XCOR Aerospace. NASA also announced the latest round of payloads to fly on the Zero-G parabolic aircraft operated by Zero Gravity Corporation. NASA's suborbital payloads announcement illustrates the high-payoff projects being pursued by NASA's Office of the Chief Technologist (OCT), a newly formed division whose purpose is to revitalize technology R&D at NASA through innovative research. The Commercial Spaceflight Federation welcomes the strong support for space technology investments and the Office of the Chief Technologist in the NASA FY2012 proposed budget, including such high-profile programs as Commercial Reusable Suborbital Research, Centennial Challenges, and NASA's commercial parabolic flight program. Other exciting NASA technology programs being supported by the agency include Cryogenic Propellant Transfer and Storage, In-Space Propulsion, Space Power Generation and Storage, Nuclear Systems, Lightweight Materials and Structures, Human-Robotic Systems, Autonomous Systems, Next-Generation Life Support, Adaptive Entry Systems, and In-Situ Resource Utilization. Web posted. (2011). [NASA Announces Its First Payloads for Commercial Suborbital Spacecraft; NASA Office of chief technologist Pursuing High-Payoff Projects[Online]. Available WWW: http://www.commercialspaceflight.com/ [2011 May 16].]

**May 17:** **STS-135: Atlantis rolls over to VAB for final mission**

The end of the space shuttle program is literally closer as Atlantis made its final rollover, from the Oribter Processing Facility to the Vehicle Assembly Building in preparation for its 33rd and final flight on STS-135 to the International Space Station. Atlantis will be mated with the external fuel tank and twin rocket boosters in the next couple weeks while in the VAB before rolling out to the launch pad, which is slated for 8 p.m. on Monday, May 31, just hours before space shuttle Endeavour is scheduled to land at Kennedy Space Center to cap the 16-day STS-134 mission at 2:30 a.m. on Tuesday, June 1. "There are two separate crews to do that so we can perform both essentially on the same day," Shuttle Launch Director Mike Leinbach said on Monday. "That will be a special day for the program and for the Kennedy Space Center." As for the launch of Atlantis and its four-man crew, it won't be on June 28 as originally projected. Because of the delay in Endeavour's final launch, it will be sometime in the middle of July, although the exact date for the first attempt won't be determined until either the end of this week or beginning of next week. Web posted. (2011). [STS-135: And then there was one – Atlantis rolls over to VAB for final mission [Online]. Available WWW: http://www.orlandosentinel.com/ [2011 May 17].]

**NASA ocean-watch satellite ready for June launch**

The US space agency said Tuesday it is preparing to launch a satellite to observe levels of salt on the surface of the world's oceans and how changes in salinity may be linked to future climate. The June 9 launch of Aquarius/SAC-D comes three months after NASA lost Glory, a 424-million-dollar Earth-observing satellite that failed to separate properly from its rocket launcher and plunged into the ocean. The orbiting science instrument will aim to map the entire open ocean every seven days from its position 408 miles (657 kilometers) above Earth, producing monthly estimates that show how salt levels change over time and location. "There are vast tracts of the ocean where salinity has never been collected, ever," said Eric Lindstrom, Aquarius program scientist at NASA, describing the high level of precision expected from the mission. "We are going to be sampling the whole planet in one week," he told reporters. While a European satellite was launched in 2009 to measure soil moisture and ocean salinity, the Aquarius/SAC-D is a global collaboration -- with partner Argentina as well as France, Brazil, Canada and Italy -- that will add to scientists' knowledge of the oceans in novel ways. Web posted. (2011). [NASA ocean-watch satellite ready for June launch [Online]. Available WWW: http://news.yahoo.com/ [2011 May 17].]

**May 18: STS-135: Atlantis set to get mated today with external fuel tank**

The process is being drawn out for Atlantis' mating with the external fuel tank and twin rocket boosters, but today NASA lifted the orbiter to the vertical position in preparation for that event. Atlantis, getting ready for STS-135, made the trip Tuesday from the Orbiter Processing Facility to the Vehicle Assembly Building. In the past, the rollover as it's called included the move, the vertical lift and the mating all in one day, but the mating may not occur until Thursday. Rollout to Launch Pad 39A is scheduled for May 31 around 8 p.m., just hours before space shuttle Endeavour is scheduled to finish its career and land at Kennedy Space Center to conclude STS-134. Atlantis will launch sometime in mid-July, but the exact date won't be determined until later this week or early next week. Web posted. (2011). [STS-135: Atlantis set to get mated today with external fuel tank [Online]. Available WWW: http://www.orlandosentinel.com/ *the write stuff blog* [2011 May 18].]

**NASA Zeroes In On Three Damaged Tiles**

NASA photo-analysts are taking a close look at three areas where heat-shield tiles on the underside of shuttle Endeavour sustained damage during launch or flight to the International Space Station. It's unclear at this time whether the astronauts might have to make a follow-up focused inspection later this week. But NASA managers say they are not worried about the shuttle or its six-member astronaut crew. "This is not cause for alarm or concern," LeRoy Cain, NASA's deputy shuttle program manager and chairman of its Mission Management Team, said in a news briefing today. "At this point we don't have any reason for concern or alarm." Damage to thermal tiles on the underside of the shuttle is not uncommon. However, if it is severe enough, it could endanger a shuttle and its crew when extreme temperatures -- up to 3,000 degrees Fahrenheit -- are encountered during atmospheric reentry. Endeavour's tile damage all was done

near sensitive areas where seals potentially could be breached during reentry. High-resolution photos taken today before the shuttle's final approach to the station detailed the trouble spots. An engineering analysis is underway at Johnson Space Center in Houston as well as other sites around the country. NASA always books a half-day during the sixth day of a shuttle mission to perform focused heat-shield inspections if necessary. A decision to do an additional look would be made by Friday at the latest. The photographs were taken from the inside of the station's Russian Zvezda core module by U.S. astronaut Cady Coleman and Italian astronaut Paolo Nespoli. Shuttle skipper Mark Kelly guided Endeavour through a back-flip designed to point the shuttle's belly toward the outpost. The eight-minute maneuver has been standard operating procedure since undetected heat-shield damage led to the 2003 Columbia accident. Web posted. (2011). [NASA Zeroes In On Three Damaged Tiles [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 May 18].]

**Crew, workers salute Atlantis' last VAB visit**

The vehicle that will usher the shuttle program into retirement was given a rock-star-like escort Tuesday. Flanked by hundreds of Kennedy Space Center workers and led by its four-man crew, shuttle Atlantis made a final trip from its processing hangar to the Vehicle Assembly Building. There, the shuttle will be hoisted onto a mobile launcher platform and outfitted with an external fuel tank and twin solid rocket boosters to prepare for a planned mid-July flight. That mission will be the fleet's last before the 30-year shuttle program ends. To give KSC workers a chance to witness the last-ever move, Atlantis spent much of the morning parked outside the VAB. Atlantis' crew -- Commander Chris Ferguson, pilot Doug Hurley and mission specialists Rex Walheim and Sandy Magnus -- paid tribute to the KSC employees who are getting their ship into flying condition. "Thanks for all the work everyone's done," Walheim said. "Thank you for what you did." The crew and KSC employees took their time admiring the last shuttle that will fly in orbit. Most recorded the moment by snapping photos, many milled around the vehicle, walking beneath its wings, while others simply applauded it. The entire time, a member of the military stood guard holding a large gun. In addition to the employees, there also was an unusually large media contingent at the event, which came less than 24 hours after shuttle Endeavour blasted off on the next-to-last shuttle mission. About 150 reporters and photographers attended. "It's one of the few opportunities where people can get that close," NASA spokeswoman Lisa Malone said. "I mean, it's like you can almost reach out and touch it." Atlantis' next move is from the VAB to launch pad 39A, which is scheduled to begin at 8 p.m. May 31, hours before Endeavour is due back at KSC's shuttle runway. Endeavour is targeting a 2:32 a.m. June 1 landing. The STS-135 mission will carry the Raffaello multi-purpose logistics module packed with supplies and spare parts for the International Space Station to help sustain operations after the shuttle fleet's retirement. Upon its return to Earth, Atlantis will be prepared for display at Kennedy Space Center Visitor Complex. Web posted. (2011). [Crew, workers salute Atlantis' last VAB visit [Online]. Available WWW: http://www.floridatoday.com/ [2011 May 18].]

**There could be space for you aboard suborbital craft**

Space exploration isn't just for astronauts anymore. It's for anyone with an interest. You could win a chance to take the ride of a lifetime to the edge of space through ARES Institute, a Brevard County-based nonprofit organization that promotes space exploration. "The whole idea of this is to involve anybody in the public who likes space or watches the space shuttle launch, or just cares a little bit," said Matthew Travis, executive director of the Aerospace Research & Engineering Systems Institute. "Anybody has a chance. There are no requirements." People have until Dec. 31, 2012 to enter the ARES sweepstakes to win a suborbital trip into space. The flight likely will take place in 2013. A suborbital trip means you blast up to space — the edge of the atmosphere; 62 miles above sea level — and then free-fall back to Earth. ARES figures the whole trip, from boarding to landing, will take a day. The winner will be chosen in the first months of 2013. Thousands already have entered. Web posted. (2011). [There could be space for you aboard suborbital craft [Online]. Available WWW: http://www.tcpalm.com/ [2011 May 18].]

**May 19:** **NASA assesses damage to shuttle Endeavour heat-shield tiles**

NASA photo analysts are taking a close look at three areas where heat-shield tiles on the underside of shuttle Endeavour sustained damage during launch or flight to the International Space Station. It's unclear whether the astronauts might have to make a follow-up focused inspection of the damage this week. But NASA managers say they are not worried. "This is not cause for alarm or concern," said LeRoy Cain, NASA's deputy shuttle program manager and chairman of its Mission Management Team. "At this point, we don't have any reason for concern or alarm." Damage to thermal tiles on the shuttle's underside is not uncommon. However, if it is severe enough, it could be dangerous when temperatures up to 3,000 degrees Fahrenheit are encountered during atmospheric reentry. Endeavour's tile damage was detected near sensitive areas where seals potentially could be breached during reentry. The trouble spots were detailed in high-resolution photos taken before the shuttle's final approach to the station. An engineering analysis is under way at Johnson Space Center in Houston as well as other sites around the country. NASA always books a half-day during the sixth day of a shuttle mission to perform focused heat-shield inspections if necessary. A decision to do an additional look would be made by Friday. Web posted. (2011). [NASA assesses damage to shuttle Endeavour heat-shield tiles [Online]. Available WWW: http://www.floridatoday.com/ [2011 May 19].]

**Masten Signs Contract With Space Florida For Demonstration Launches**

Masten Space Systems and Space Florida announced today the signing of a $400,000 contract under which Masten will perform a series of demonstration flights of a Vertical Takeoff Vertical Landing (VTVL) reusable suborbital launch vehicle from Launch Complex 36 at Cape Canaveral Air Force Station. Under the contract, Masten will complete multiple flights. These operations will serve as a pathfinder to assist Space Florida in developing operational requirements for VTVL vehicles, recommending the optimum operational scenario, and determining the program schedule to achieve launch capability as soon as possible. In conjunction with the demonstration launches to be performed by Masten Space Systems, Space Florida has committed additional funds for Range costs and facilities upgrades at Launch Complex 36. In addition to providing Masten with Range support and the base infrastructure required for future sustained operations, this investment is anticipated to shorten processing timelines at the Eastern Range for other new vehicles, as well as provide a benchmark for Range costs that will enable faster and cheaper setup for other commercial launch providers. The upcoming flights will also enable Masten to fully evaluate Florida, CCAFS, and LC-36 as a base for the company's flight operations group. Web posted. (2011). [Masten Signs Contract With Space Florida For Demonstration Launches [Online]. Available WWW: http://www.spaceref.com/ [2011 May 19].]

**Endeavour preps for spacewalk, closer look at tile damage**

Endeavour astronauts are preparing for the first of four planned spacewalks early Friday while NASA continues to review a damaged heat shield tile that may require closer inspection. The tile was apparently gouged by ice falling from the shuttle's external tank during Monday's morning's launch from Kennedy Space Center. NASA will decide by Friday whether to perform a so-called "focused" inspection on Saturday, using a boom with cameras and lasers to scan the area of interest in greater detail. Though such inspections are not common, LeRoy Cain, the head of NASA's mission management team, said he was not alarmed by the damage. He said a closer inspection would provide higher fidelity images that might allow analysts to back off from overly conservative assumptions and likely clear any need for repairs. The tile in question is located behind the right landing gear door. It measures about 3.2 inches by 2.5 inches and 0.7 inches thick. One other tile, on the right inboard elevon, has not yet been cleared but is expected to be. Cain said a similarly damaged tile on a 2007 Endeavour flight was cleared after a focused inspection. The commander of that flight was Scott Kelly, brother of current commander Mark Kelly. The 10-year-old tank that helped launch Endeavour this week did not have all of the modifications made to new tanks after the 2003 Columbia disaster, and Cain said some debris was expected. The ice apparently originated from a liquid oxygen propellant feedline bracket. If the damage turns out to be more serious than thought, spacewalkers could attempt repairs. Meanwhile, the mission marches on. Astronauts Drew Feustel and Greg Chamitoff plan to kick off the spacewalking activity around 3:15 a.m.

EDT. Over six-and-a-half hours, they'll retrieve and install science experiments, install a communications antenna and route jumper cables in preparation for topping off a leaking coolant line on the mission's second spacewalk, planned Sunday. Web posted. (2011). [Endeavour preps for spacewalk, closer look at tile damage [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 May 19].]

**Endeavour's boosters to be stored to fly again someday**

The shuttle Endeavour's two spent solid rocket booster casings returned to a Cape Canaveral hangar Wednesday to undergo inspections and cleaning before being put into storage for potential future use on commercial or heavy-lift launchers. Comprised of parts that flew on 59 previous shuttle flights, the boosters were towed into Port Canaveral late Tuesday to spend the night. NASA's two solid rocket booster recovery ships moved the booster casings to Hangar AF at Cape Canaveral Air Force Station on Wednesday, according to an agency spokesperson. The boosters separated about two minutes into Endeavour's launch Monday, reaching a peak altitude of nearly 45 miles before parachuting into the Atlantic Ocean about 140 miles off the coast of Florida. Recovery teams fished the boosters out of the water and towed them back to shore. Engineers will inspect the empty casings and wash them out before loading the booster segments on a train for a ride back to Clearfield, Utah. After further checks and cleaning, the boosters will be put into storage, according to Jim Halsell, vice president of space exploration systems for ATK, the solid rocket motor contractor. Instead of immediately filling the segments with more fuel, ATK plans to store the empty casings in hopes of using the hardware again on a new kind of rocket. Other shuttle boosters are getting the same treatment. ATK is developing the commercial Liberty rocket to transport astronaut crews to low Earth orbit. The company is also favored to win a contract to supply the solid rocket boosters for a NASA heavy-lift launcher called the Space Launch System. Both of the new rockets would use extended and upgraded five-segment solid rocket motors -- on the first stage of Liberty and as twin shuttle-like boosters on the SLS heavy-lifter. The Liberty uses a single five-segment motor first stage and a European Vulcain 2 engine for the second stage. It could be ready for a bare-bones test flight by 2013, ATK says. A demonstration for NASA's Space Launch System would take more time because it would be powered by two solid rocket boosters. And the design and construction of the heavy-lifter's core first stage has not yet begun. Web posted. (2011). [Endeavour's boosters to be stored to fly again someday [Online]. Available WWW: http://www.spaceflightnow.com/ [2011 May 19].]

**May 20: Final space shuttle launch set for July 8**

The final launch of NASA's space shuttle program has been set for the morning of July 8. NASA announced Friday that shuttle Atlantis is targeted for an 11:40 a.m. launch from Kennedy Space Center on Friday, July 8. It will be the 135th and final launch of the 30-year space shuttle program. Space shuttle Endeavour, which blasted off Monday on the penultimate mission, is currently docked at the International Space Station. It's due back on Earth June 1. Atlantis is scheduled to roll out to the launchpad the night before, on May 31. Atlantis is scheduled for a 12-day mission, largely to provide supplies to the space station – which is slated to remain in operation until 2020 -- and to perform maintenance. The crew also will be delivering equipment to run experiments to see if it could be possible to refuel satellites in space, including satellites not designed to be serviced. After Atlantis, all crew will travel to the space station aboard Russian rockets, with commercial rockets scheduled to begin cargo delivery to the station by next year. Those rockets may in the future be certified to carry humans. Atlantis will carry just four astronauts – all veterans of previous space flights. Chris Ferguson, 49, from Philadelphia, a veteran of shuttle missions in 2006 and '08, will command the flight. Doug Hurley, 44, from Apalachin, N.Y., will serve as the pilot, a role he previously filled in 2009. Sandy Magnus, 46, of Belleville, Ill., and Rex Walheim, 48, of San Carlos, Calif., will be the mission specialists. Atlantis first launched in 1985, and this will be its 33rd and final flight. After it lands, it will be reconditioned and kept as a museum piece at the Kennedy Space Center Visitor Complex. Web posted. (2011). [Final space shuttle launch set for July 8 [Online]. Available WWW: http://www.orlandosentinel.com/ [2011 May 20].]

**Endeavour's heat shield tile nick not worrisome to NASA**

Endeavour astronauts planned to embark on the first of their mission's four spacewalks early today as managers finalized plans for a possible closer look at a damaged heat shield tile. The roughly 3-by-2-inch gouge in a tile near the right landing gear door was apparently caused during Monday's launch by ice falling from Endeavour's external tank, which was the oldest ever flown and did not include all the modifications made after the Columbia disaster in 2003. However, LeRoy Cain, head of NASA's mission management team, said he expected a so-called "focused" inspection early Saturday -- if required -- would likely clear the tile as safe for re-entry. It was still possible analysts reviewing images taken during Endeavour's launch and approach to the International Space Station could deem the damage acceptable without having to take the closer look. Otherwise, shuttle crew members would use a boom equipped with high-resolution cameras and laser sensors to inspect the area. Endeavour's crew performed a full scan of the orbiter's underside, wing edges and nosecap the day after Monday's launch from Kennedy Space Center. Another inspection will be performed before undocking next week. When asked about the damage during interviews Thursday, Mark Kelly said he'd been focused on the mission's busy day of work but wasn't too concerned by preliminary information. Today, Endeavour mission specialists Drew Feustel and Greg Chamitoff had been scheduled to float outside the station's Quest airlock around 3:15 a.m. During 61/2 hours, they planned to retrieve and install science experiments, install a communications antenna and route jumper cables in preparation for work to top off a leaking coolant loop. The spacewalk follows Thursday's successful installation of a $2 billion cosmic ray detector that is now the station's signature science experiment. A handoff between robotic arms lifted the Alpha Magnetic Spectrometer from the shuttle's payload bay and fastened it to a perch outside the station, completing Endeavour's top mission objective. Within hours, the 7.5-ton instrument began recording a blitz of cosmic particles estimated at 25,000 per second, its sensitive detectors working flawlessly. AMS will search for dark matter, antimatter and other unusual matter by measuring high energy-charged particles emanating from distant stars and galaxies. Web posted. (2011). [Endeavour's heat shield tile nick not worrisome to NASA [Online]. Available WWW: http://www.floridatoday.com/ [2011 May 20].]

**Chinese Journalists Barred From Shuttle Launch**

Chinese journalists were denied access to this week's space shuttle launch in what is believed to be the first application of a congressional ban on interactions between NASA and the Chinese government. The 16 May launch of the Endeavor was a big news story for China because its scientific payload, the $2 billion Alpha Magnetic Spectrometer, was built in part by Chinese scientists. But journalists seeking to cover the event—the penultimate flight before the shuttle fleet is retired—weren't allowed into the Kennedy Space Center. A NASA spokesperson says the agency was simply following instructions in last month's 2011 spending bill that averted a government-wide shutdown. The legislation prohibits NASA from using any resources to host visits by a Chinese official to any NASA facility as well as for collaborations with any Chinese government entity. The Chinese journalists work for Xinhua, the official Chinese news agency, and thus are considered government employees. The language was written by Representative Frank Wolf (R-VA), chair of a House of Representatives spending panel that oversees NASA's budget. Wolf is a vocal critic of China's human rights record and what he believes are government-sanctioned cyber-attacks on U.S. institutions and businesses. Xinhua editorialized about NASA's decision in an article that appeared Wednesday in China Daily. "Chinese journalists were denied the opportunity to make live coverage of the shuttle's blast-off, just as their peers from other countries have done. The Chinese journalists were also kept away from NASA's press conferences. Obviously, the "Wolf Clause" runs counter to the trend that both China and the United States are trying to push ahead their exchanges and cooperation in science and technology." Web posted. (2011). [Chinese Journalists Barred From Shuttle Launch [Online]. Available WWW: http://news.sciencemag.org/ [2011 May 20].]

**NASA's Atlantis Moves To Launch Pad May 31 For Final Shuttle Launch**

Space shuttle Atlantis will begin moving to its launch pad at 8 p.m. EDT on May 31, at NASA's Kennedy Space Center in Florida. The six-hour rollout from Kennedy's Vehicle Assembly Building is a major milestone as Atlantis is prepared for the final shuttle launch targeted for July 8. ["NASA's Atlantis Moves To Launch Pad May 31 For Final Shuttle Launch," **NASA Media Advisory #M11-097**, May 20, 2011.]

**Orbital Sciences Eyes West Coast Missions for Taurus 2 Launcher**

Orbital Sciences Corp.'s business case for its Taurus 2 rocket, scheduled to debut this year, assumes two or three launches per year for the next decade, with liftoffs occurring from a future West Coast spaceport in addition to the company's new launch pad at NASA's Wallops Flight Facility on Virginia's eastern shore. Mark Pieczynski, Orbital vice president of space launch business development, says the Dulles, Va.-based company has spent the past several months eyeing two launch sites on the West Coast that would allow the company to deliver medium-class payloads to high-inclination and sun-synchronous orbits: Vandenberg Air Force Base, Calif., and Kodiak Island, Alaska. The company expects to decide on a site before the end of the year, he said. High-inclination, or near-polar, orbits are typically used for Earth observation because they provide global coverage. Vandenberg and Kodiak are geographically suited for launches to such orbits. Web posted. (2011). [Orbital Sciences Eyes West Coast Missions for Taurus 2 Launcher [Online]. Available WWW: http://www.spacenews.com/ [2011 May 20].]

**May 22: Jobs challenge ahead for Kennedy Space Center**

Endeavor's blast off last week began the countdown to the final shuttle launch in July and the start of a cruel summer for thousands of space workers who will soon be out of work. The spring wasn't any kinder. It brought the end of any hope the Space Coast might have had left for $40 million first promised last year by President Obama to help blunt the pain of the end of the shuttle program. Last year Obama traveled to Kennedy Space Center and announced the initiative in front of hundreds of cheering workers and dignitaries. The money never made it into the federal budget compromise agreed to last month. Today, the best the administration has to offer is a proposal to spend $5 million in 2012 for a commercial spaceflight facility at KSC. While the project is a necessary and welcome development for the next phase of the space center, it would hire just 50 people over the next two years, hardly much of a comfort for the loss of 7,000 jobs in Florida tied to the shuttle. The $40 million was supposed to provide a small infusion of venture capital or investments in start-ups with growth potential in the area as well as infrastructure improvements to aid in attracting more jobs. It certainly wasn't enough to solve the myriad of problems the region will face after the shuttle is mothballed for good, but it offered some resources for promoting new businesses. Now that job is falling to a group of local and state agencies and boards, including Workforce Brevard. Lisa Rice, president of that organization, said 4,000 workers have already submitted their resumes to a state online job board. That number is expected to increase as another estimated 1,700 people are laid off after Atlantis makes the program's final trip into orbit in just seven weeks. "As they get the major layoffs going in July and on into August, it's going to become harder and harder to keep up with everybody," she said. "Our biggest challenge is how are we going to handle this big spike?" For as dire as the employment outlook seems, Brevard Workforce is promoting its early success stories. Web posted. (2011). [Jobs challenge ahead for Kennedy Space Center [Online]. Available WWW: http://www.floridatoday.com/ [2011 May 22].]

**May 23: Soyuz's parting shot of Endeavour, space station could be one for history**

Iconic images of the shuttle joined to a completed International Space Station will be snapped tonight if an unprecedented space operation goes off as planned. For the first time, a Russian space taxi is scheduled to leave the station while a shuttle is docked there. The departure presents what may be the only opportunity to take pictures NASA and many space fans covet of the shuttle, on the eve of its retirement, parked at the $100 billion outpost that is its greatest legacy. "Hopefully those pictures will show up in textbooks for years to come," said Kenny Todd, NASA's station manager for operations and integration. About 5:30 p.m., a Soyuz spacecraft piloted by Russian cosmonaut Dmitry Kondratyev and carrying a

NASA astronaut and an Italian astronaut will undock from a port 50 feet from Endeavour and back away to a distance of about 650 feet. The station then will rotate 130 degrees in an unusual sideways pose that offers a good view of the station, Endeavour, and two cargo ships flown by Russia and Europe. Before 6 p.m., Italian astronaut Paolo Nespoli will climb temporarily into the windowed Soyuz module -- a part of the craft that burns up during re-entry -- and begin taking pictures and video of the shuttle and station floating 220 miles above the planet. Nespoli will have about five minutes to take in the unique view before Soyuz thrusters fire to separate the spacecraft from the station and put Kondratyev, Nespoli and American Cady Coleman on route to a landing in Kazakhstan late tonight. It sounds simple enough, but the whole process involves risks that took years to gain acceptance. Interest in the photo kicked into gear before Discovery's February launch, which created a once-in-a-lifetime opportunity to show off the station with each international partner vehicle there. NASA proposed having one of two Soyuz spacecraft at the station undock and perform a "flyabout" to take the pictures before returning to its port. Russian officials nixed the idea, citing concerns about performing the maneuvers with a new-model vehicle whose systems weren't fully tested. Planning for a photo was pushed back to the Atlantis mission targeted to launch July 8 -- the last time a shuttle would visit the station. The opportunity arose when shuttle and station program leaders approved what is known as "dual docked operations." In the past, vehicles coming and going from the station were conflicts for a shuttle mission to avoid. Thruster firings create plumes of rocket fuel and potential debris that could damage sensitive orbiter systems, including cockpit windows, star-tracking devices and sensors used for heat shield inspections. Another showstopper could be coordinating shuttle and Soyuz crew schedules so each gets enough rest and can execute their separate missions without interference. In this case, engineers determined the plume risk was acceptable based on where the Soyuz is docked and its flight profile, and the schedules could be managed. If the effort succeeds, Todd said he hopes the photos give future generations an appreciation for the feat represented by the station, which couldn't have been built without the shuttle. Web posted. (2011). [Soyuz's parting shot of Endeavour, space station could be one for the history books [Online]. Available WWW: http://www.floridatoday.com/ [2011 May 23].]

**NASA Honors Human Spaceflight Achievements**

NASA is inviting the general public and journalists to a special concert at 7 p.m. EDT on Wednesday, May 25, at the John F. Kennedy Center for the Performing Arts in Washington to honor American achievements in human spaceflight. The event, "Human Spaceflight: the Kennedy Legacy" is a musical celebration on the 50th anniversary of President Kennedy's speech to Congress when he challenged our nation to land a man on the moon and return him safely to Earth. The one-hour concert will feature the Space Philharmonic under the baton of Emil de Cou. NASA Administrator Charles Bolden, astronauts and special, surprise guests will participate in the event along with local high school musical groups and the Soldier's Chorus of the U.S. Army Field Band. A limited number of tickets is available for the general public on a first-come, first-served basis. ["NASA Honors Human Spaceflight Achievements At Kennedy Center Concert," **NASA Media Advisory #M11-098**, May 23, 2011.]

**May 24: NASA says recent crane accident will not affect Mars launch later this year**

NASA says a piece of hardware that will fly on the next mission to Mars was not damaged in a recent lifting accident. The space agency says the rover Curiosity will launch in late November as planned. During rehearsal last week in Florida where parts of the rover have been shipped for launch, a crane operator accidentally lifted the rover's protective back shell while it was still bolted to a table. Since the back shell is not designed to take the extra weight, engineers inspected the structure but found no damage. Curiosity is expected to land on Mars in summer 2012 to study whether the red planet ever had the right conditions to support primitive life. NASA's Jet Propulsion Laboratory manages the program, formally known as the Mars Science Laboratory. Web posted. (2011). [NASA says recent crane accident will not affect Mars launch later this year [Online]. Available WWW: http://www.orlandosentinel.com/ [2011 May 24].]

**NASA preparing to put astronauts on commercial rockets**

NASA wants private companies such as Boeing or SpaceX to put astronauts on their rockets by mid-decade, to provide the next American space vehicles to replace the space shuttles. And it's setting up a new Commercial Crew Program office at Kennedy Space Center to set standards for how to do it. More than 200 senior executives from dozens of private space companies are meeting with NASA officials here this week to talk about what NASA – and the companies -- can expect when the agency's new program becomes operational. Space shuttle Atlantis is set to launch in July to take four astronauts, equipment and supplies to the International Space Station, ending the 30-year,135-flight shuttle program. That will leave Russian-built Soyuz spacecraft as the only alternative for getting astronauts to the space station, until the private contractors are ready. "We are set to have Soyuz go through 2015. So we need to have a system that is ready at or near that time," said Ed Mango, manager of NASA's Commercial Crew Program. "The longer we have tax dollars go overseas, that's probably not a good thing." Mango's office – only about 50 employees now and possibly 100 soon – doesn't come close to replacing the shuttle program, which at its peak employed more than 10,000 at KSC. But NASA's decision to establish it here, with a branch office at Houston's Johnson Space Center, ensures that KSC will be the future hub of private rocket activity, said Frank DiBello, president of Space Florida, Florida's agency designed to promote space-related economic development. "The importance of the KSC role will grow," DiBello said. "The telling tale of the viability of the program will be in the 2012 [federal] budget." The program has $300 million this year, most of which is being spent on concept development contracts with four private companies interested in flying their own rockets: Boeing, SpaceX, Sierra Nevada Corp. and Blue Origin. SpaceX launched an unmanned Dragon capsule into orbit – and returned it to Earth – late last year, while Boeing has made a generation of satellite-launching Delta rockets. Mango said the proposed program budgets will provide $850 million a year for the next five years to develop "human-rated" commercial rockets. That should be plenty to get at least two companies ready to launch astronauts by the end of 2015, "if not sooner," said John Gedmark, executive director of the Commercial Spaceflight Federation, which represents space industry companies. SpaceX has said it can get astronauts into space even quicker. But the money needs to be approved by Congress, and NASA needs to develop new processes to certify that a private rocket is safe to carry humans. That is what brought together NASA and industry officials for Tuesday's workshop at a DoubleTree Hotel here. Also Tuesday, NASA announced in Washington that it is committed to developing the capsule called Orion - which has already received $5.3 billion in NASA funds under the since-cancelled Constellation program – as its next manned space flight vehicle. Orion is slated to be assembled at KSC, which should produce "hundreds of jobs," according to U.S. Sen. Bill Nelson, D-Fla. But in a conference call, NASA officials did not release estimates on when Orion will be ready, how much it will cost, where it will go or even what rocket it will ride. Web posted. (2011). [NASA preparing to put astronauts on commercial rockets [Online]. Available WWW: http://www.orlandosentinel.com/ [2011 May 24].]

**NASA announces new name, role for spacecraft**

NASA announced Tuesday that it found the ideal spaceship to take astronauts far from earth — the same one they've been working on for several years and have spent $5 billion on. All the Orion capsule needed was a new name — the Multi-Purpose Crew Vehicle. NASA said it decided the spacecraft would be what takes astronauts to a still-to-be-determined destination. The disposable capsule would take four astronauts on 21-day trips. The Orion capsule was a cornerstone of former President George W. Bush's plan to return astronauts to the moon. NASA gave Lockheed Martin of Bethesda, Md., a $7.5 billion contract in 2006 to build it. The Multi-Purpose Crew Vehicle is the same ship with almost no changes, said NASA associate administrator Doug Cooke during a Tuesday teleconference. The capsule is the only part of the Bush space plan that President Barack Obama did not cancel last year. NASA said then the Orion capsule could be used as an escape lifeboat at the International Space Station. Now the ship will be attached to a still-to-be-designed big rocket and go out of Earth's orbit. Possible destinations include nearby asteroids and eventually Mars. Cooke had no date for launching the capsule with astronauts aboard, no specific destination, and no eventual cost of each capsule or the entire program. But it will cost less than the

original plan because NASA has found some "efficiencies," Cooke said, without elaborating. The ship would not be reusable because it will land in the Pacific Ocean and salt water corrodes metal. It will land like the Apollo capsules with a parachute and weigh about 23 tons. Sen. Bill Nelson, a Florida Democrat and former space shuttle flier, said using Orion means a "huge savings" for taxpayers because billions have already been spent on it. Web posted. (2011). [NASA announces new name, role for spacecraft designed for scrapped moon mission [Online]. Available WWW: http://www.orlandosentinel.com/ [2011 May 24].]

**May 25: NASA picks robotic asteroid voyager for liftoff in 2016**

Touting its ability to lay the groundwork for future human voyages, NASA officials announced Wednesday a robotic probe named OSIRIS-REx will launch to an asteroid in 2016 and return up to 4 pounds of rock and dust to Earth seven years later. Led by a research team at the University of Arizona in Tucson, OSIRIS-REx will approach a carbon-rich asteroid and collect samples with an air gun. Scientists expect the asteroid harbors organic molecules, the building blocks that may have kick-started life on Earth. OSIRIS-REx stands for the Origins, Spectral Interpretation, Resource Identification, Security-Regolith Explorer. After blasting off from Florida in September 2016, the craft will reach an asteroid designated 1999 RQ36 in 2020. Once it maps the surface from a close-up orbit, the probe will descend and extend a robot arm to blow nitrogen gas on the surface, lifting particles into a capture mechanism. The total cost of OSIRIS-REx is expected to be around $1 billion, including a launch vehicle to send it away from Earth, according to Jim Green, director of NASA's planetary science division. The target asteroid is rich in carbon and spans approximately 1,900 feet in diameter. Its orbit crosses the path of Earth every September. Web posted. (2011). [NASA picks robotic asteroid voyager for liftoff in 2016 [Online]. Available WWW: http://www.spaceflightnow.com/ [2011 May 25].]

**May 26: Rocket-engine maker lays off 300, including 69 at Cape**

Rocket-engine maker Pratt & Whitney Rocketdyne is laying off about 300 people, including 69 at its facility at Kennedy Space Center, the company said this week. The company, which has powered missions to virtually every planet in the solar system, cited a sluggish economy, uncertainty in the space industry and concerns about government spending as reasons for the job cuts. "We must take difficult steps to ensure our cost structure is competitive during these challenging times," the company said in a statement. "This action is part of the company's continuous effort to align its workforce to meet customers' needs and to respond to the prevailing business conditions and outlook." The Kennedy layoffs were included in the state's regular announcements of major job reductions around the state. The company said it had already cut back in other areas, reducing spending on facility space, salaries and travel. Salaried workers who are being let go will receive severance packages that include benefits. The layoffs will affect all Pratt & Whitney sites, including facilities in Florida, Alabama, California and Mississippi. The company has a manufacturing site in West Palm Beach. The impact in Florida is less than a third of the total planned cuts. The company is the nation's leading maker of rocket engines. Web posted. (2011). [Rocket-engine maker lays off 300, including 69 at Cape [Online]. Available WWW: http://www.orlandosentinel.com/ [2011 May 26].]

**NASA says commercial rockets will fly to space station by 2012**

NASA's plans to use commercial rockets to supply the International Space Station are running almost two years behind schedule and will cost $300 million more than expected, according to a watchdog report presented to Congress on Thursday. The agency expects SpaceX of California and Orbital Sciences of Virginia to start delivering cargo to the station in 2012 or earlier, replacing the space shuttle – which will be retired this summer. "NASA is pleased with the steady progress both companies continue to make in their cargo development efforts," said Bill Gerstenmaier, NASA associate administrator, told a congressional panel Thursday. He added both companies have experienced "technical and schedule challenges" but those setbacks were "not uncommon." The report by the Government Accountability Office, a federal watchdog agency, was part of a two-hour hearing to examine the progress of NASA's

Commercial Orbital Transportation Services (COTS) program. Started in 2005, the program will funnel $800 million to help private companies build rockets and capsules that can deliver cargo to the station. COTS funding helped SpaceX make history in December when it blasted a capsule into orbit and returned it safely -- becoming the first non-government entity ever to do so. However, that demonstration flight was 18 months late, and upcoming flights set for later this year and early 2012 also are behind schedule as SpaceX deals with propulsion and navigation problems, according to the GAO. Orbital also is late, having rescheduled a first demonstration flight from December 2010 to a year later as it works on everything from avionics to building a launch facility at Wallops Island, Va. Web posted. (2011). [NASA says commercial rockets will fly to space station by 2012 [Online]. Available WWW: http://www.orlandosentinel.com/ [2011 May 26].]

**May 27:** **NASA lays claim to Atlas 5 rocket for the rest of 2011**

The U.S. Air Force plans to launch navigation and communications satellites on Delta 4 rockets later this year while a battery of NASA payloads, including missions to Jupiter and Mars, occupy the Atlas 5 rocket manifest, according to military officials. The Pentagon launched the first geostationary Space Based Infrared System satellite, or SBIRS GEO 1, on an Atlas 5 rocket May 7, clearing the way for NASA's Juno and Mars Science Laboratory missions to blast off this summer and fall. Juno is a radiation-hardened orbited scheduled for launch Aug. 5 on the most powerful version of the Atlas 5 rocket. With five strap-on boosters and a five-meter payload fairing, the Atlas will send Juno on a five-year journey to Jupiter. NASA's next Mars rover will lift off Nov. 25 on the next Atlas 5 rocket on an eight-month trip to the Red Planet. The back-to-back NASA missions are keeping some military payloads on the ground, including the U.S. Navy's first Mobile User Objective System narrowband communications satellite. The Air Force launched the high-priority SBIRS GEO 1 spacecraft May 7, then yielded the Atlas manifest until for civilian missions until military flights resume in early 2012. Web posted. (2011). [NASA lays claim to Atlas 5 rocket for the rest of 2011 [Online]. Available WWW: http://www.spaceflightnow.com/ [2011 May 27].]

**Endeavour spacewalk marks 1,000 hours on station work**

The crew of the US space shuttle Endeavour wrapped up their fourth and final spacewalk Friday, a walkabout that surpassed the 1,000th hour of such trips to build the International Space Station. The marathon seven hour, 24 minute spacewalk began at 7:39 am (0415 GMT) and mission specialists Mike Fincke and Greg Chamitoff finished at 7:39 am (1139 GMT), NASA said. Spacewalks typically last six and a half hours. "At 5:02 am, Fincke and Chamitoff surpassed the 1,000th hour astronauts and cosmonauts have spent spacewalking in support of space station assembly and maintenance," NASA said. "The milestone occurred four hours and 47 minutes into today's spacewalk, the 159th in support of station assembly and maintenance, totaling 1,002 hours, 37 minutes." Web posted. (2011). [Endeavour spacewalk marks 1,000 hours on station work [Online]. Available WWW: http://news.yahoo.com/ [2011 May 27].]

**U.S. Honor Flag will fly on shuttle's final journey**

The U.S. Honor Flag has flown in Iraq and Afghanistan, at Ground Zero and during the funerals of countless law enforcement personnel nationwide, including 10 this year in Florida. And during a ceremony Thursday at Kennedy Space Center Visitor Complex, about 100 police officers handed the flag to NASA so it can fly on shuttle Atlantis' final mission. "Now to be able to honor astronauts with it, too, it says a lot," said Robert Cabana, KSC director. "To take something significant like this onboard, it just adds one more significant event that the shuttle has helped participate in." In front of the Space Mirror Memorial, Cabana gave the folded flag to Jerry Ross, a former astronaut who flew on a record seven shuttle missions. Ross will travel with the flag to Johnson Space Center in Houston, where it will remain until the launch, which is scheduled for July 8. The flag was donated by the Texas House of Representatives just after the Sept. 11 terrorist attacks and is meant to honor people who serve the country and its communities. James Loftus, director of the Miami-Dade Police Department, said the flag was

special to him because it flew at the funerals of two of his officers who were killed Jan. 20. That flag is a very important symbol of our culture, and now it's being embraced by an entirely different culture," Loftus said. "I think that's a wonderful thing." Web posted. (2011). [U.S. Honor Flag will fly on shuttle's final journey [Online]. Available WWW: http://www.floridatoday.com/ [2011 May 27].]

**May 30: Space shuttle laser test could help guide asteroid missions**

Astronauts piloted the shuttle Endeavour on a unique course back toward the International Space Station Monday, testing a next-generation laser-based navigation sensor in hopes of verifying it can help guide future voyages to the space station, distant asteroids and Mars. After undocking from the orbiting lab at 11:55 p.m. EDT Sunday, pilot Greg Johnson flew Endeavour on a 360-degree flyaround of the station, then sent the shuttle on a looping trajectory more than 5 miles above and behind the station. A series of thruster firings next propelled the ship back toward the outpost, approaching from behind and below as a laser system fired pulses 30 times per second to compute range and bearing data. The shuttle halted its approach 950 feet below the station, then burned its jets again to exit the lab's vicinity as Endeavour's crew began preparations for their return to Earth early Wednesday. "Over the past year and a half, it's been a pleasure to work with the hardware and software developers for STORRM," radioed Drew Feustel, the astronaut charged with monitoring the experiment. Endeavour commander Mark Kelly and pilot Greg Johnson oversaw the jet firings from the shuttle's flight deck. The second approach, called a re-rendezvous in NASA parlance, capped Endeavour's 12-day stay at the space station, which added a $2 billion particle physics experiment named the Alpha Magnetic Spectrometer, delivered a platform full of spare parts and helped maintain the lab's finicky oxygen generation and carbon dioxide scrubbing systems. Called STORRM, the experiment's objective was to try out a high-tech laser navigation system that NASA could use on future voyages to the space station and beyond. STORRM stands for Sensor Test for Orion Relative Navigation Risk Mitigation. NASA tapped Endeavour to take the sensor on a test run. The shuttle flew back to the space station on a unique trajectory designed to mimic how an Orion spacecraft would approach the complex. The Orion capsule, also known as the multi-purpose crew vehicle, could use the laser sensor to guide itself to destinations across the solar system, ranging from the space station 200 miles from Earth to asteroids millions of miles away. Officials said they will continue analyzing data from the STORRM experiment, and workers expect to remove the sensors from the shuttle's payload bay about a week after landing. After some initial testing at the Kennedy Space Center, the laser and docking camera will be shipped to a Lockheed Martin docking simulation facility in Denver. Web posted. (2011). [Space shuttle laser test could help guide asteroid missions [Online]. Available WWW: http://www.spaceflightnow.com/ [2011 May 30].]

## JUNE

**June 1: Endeavour completes final mission; one flight left for NASA**

The space shuttle Endeavour landed at Kennedy Space Center in Florida early Wednesday, completing its 25th and final mission -- the next-to-last mission for NASA's 30-year-old space shuttle program. "Welcome home, Endeavour," Mission Control in Houston said. The spacecraft touched down at 2:34 a.m. ET at the end of a nearly 16-day mission to the International Space station. "It's sad to see her land for the last time, but she really has a great legacy," said shuttle commander Mark Kelly after Endeavour rolled to a stop in the darkness of a warm Florida morning. The youngest of the shuttles retires after 25 space flights. During 299 days in space, Endeavour orbited the earth 4,671 times and logged almost 122.9 million miles, NASA said. It first went into service in 1993. Endeavour unlocked from the International Space Station late Sunday after spending more than 11 days linked to the orbiting laboratory, where the astronauts installed a cosmic ray detector. The $2 billion, 15,000-pound machine is already at work "gathering information that could improve our understanding of the universe," Kelly said. "The retirement of Endeavour and the shuttle fleet will not end the human need to explore," Kelly said in comments from space that were posted on NASA's website. "It is and always will be part of who we are. The United States will build other spaceships better than those of today. Even if they are years in the future, they will nevertheless increase our knowledge of the world, generate an enormous benefit to the economy and inspire our children." On July 8, space shuttle Atlantis is to make NASA's final shuttle flight. Thousands of people turned out Tuesday night at Kennedy Space Center to watch it make the three-mile trip from the Vehicle Assembly Building to the launch pad. "Look how majestic it looks rolling out to the launch pad," said astronaut Sandy Magnus to reporters. "Look at that and see what we can do when we put our minds to it." Web posted. (2011). [Endeavour completes final mission; one flight left for NASA [Online]. Available WWW: http://www.cnn.com/ [2011 June 1].]

**Orbiter Atlantis At Pad for Final Shuttle Launch**

Shuttle Atlantis settled in at its Kennedy Space Center launch pad today in advance of NASA's final shuttle flight, arriving a little less than an hour after Endeavour landed five miles to the west, winding up that orbiter's 25th and final flight. In what amounted to a historic double-header, Atlantis started rolling up onto its launch pedestal at pad 39A just about the same time Endeavour rolled to a stop on Runway 15 at the Shuttle Landing Facility. The shuttle was "hard-down" on the pad at 3:29 a.m. Endeavour landed 2:35 a.m., capping a 6.5-million-mile mission. Atlantis departed the KSC Vehicle Assembly Building at 8:42 p.m. -- 42 minutes later than planned. A hydraulic system seal leak prompted the delay. Atlantis completed the 3.5-mile trip in a little less than six hours. Atlantis and four astronauts are scheduled to launch at 11:38 a.m. July 8 on a two-week supply run to the International Space Station. The mission will be the 33rd for Atlantis and the 135th and final flight for the shuttle program. Web posted. (2011). [Orbiter Atlantis At Pad for Final Shuttle Launch [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 June 1].]

**Shuttle's sonic booms lead to arrests in Kissimmee burglary spree**

Two men were arrested today, accused of breaking into several cars and a home in Kissimmee's Remington subdivision. And space shuttle Endeavour gets some of the credit. Deputies responded to a call at about 2:31 a.m. today at a home on Amanda Kay Way in Kissimmee. The victim told deputies she had been awakened by the sonic booms of Endeavour passing overhead en route to its final landing at Kennedy Space Center. When she looked outside, she saw two men inside her car, which was parked in her driveway, the Sheriff's Office said. She then saw the pair run through her yard and get into another vehicle. Deputies quickly located the suspects, who provided information about four more car burglaries and a residential burglary in the subdivision. The investigation is ongoing, and more charges are pending, the Sheriff's Office said. Web posted. (2011). [Shuttle's sonic booms lead to arrests in Kissimmee burglary spree [Online]. Available WWW: http://www.orlandosentinel.com/ [2011 June 1].]

**Boeing Opens Exploration Launch Systems Office in Florida**

Boeing has established an Exploration Launch Systems Engineering and Integration office in Titusville to support the operational readiness of NASA's next launch system, currently under study. "This new Boeing office near NASA's Kennedy Space Center expands our capability to execute our current Upper Stage Production and Instrument Unit Avionics contracts, as well as continue our support of NASA as it lays the groundwork for development of heavy-lift launch vehicle concepts," said Jim Chilton, Exploration Launch Systems vice president for Boeing. "We plan to ensure critical skills and capabilities are retained to provide a smooth workforce transition from the Space Shuttle program that builds on accomplishments and investments made to date." The Florida office complements Boeing's ongoing work on the Upper Stage Production and Instrument Unit Avionics contracts held at NASA's Marshall Space Flight Center in Huntsville, Ala., and the Michoud Assembly Facility in New Orleans. Boeing recently submitted trade studies and detailed cost and schedule information to NASA so the agency can evaluate the company's heavy-lift launch vehicle system concepts, propulsion technologies and affordability. Boeing's 50-year history in human spaceflight and its skilled workforce will enable missions beyond Low Earth Orbit to transport payloads such as large-array telescopes and to explore deep space. Web posted. (2011). [Boeing Opens Exploration Launch Systems Office in Florida [Online]. Available WWW: http://boeing.mediaroom.com/ [2011 June 1].]

**Space shuttle Endeavour not expected to arrive in L.A. until late 2012**

The space shuttle Endeavour is expected to arrive at its permanent retirement home in Los Angeles in the latter half of 2012, the president of the California Science Center said Wednesday. Initially, museum officials had said the shuttle could arrive by the end of this year. But NASA officials said it would take longer to detoxify the space shuttle and prepare it for retirement. Complicating the timeline was the delay in Endeavour's final mission and preparation for the upcoming mission of the shuttle Atlantis in July, which will mark the last voyage of the space shuttle program. In the meantime, Jeffrey Rudolph, the California Science Center's president, said the museum, in Exposition Park, is making progress raising $28.8 million to pay for Endeavour's cleanup at the Kennedy Space Center in Florida and to bring it to Los Angeles. Parsons, a global engineering firm based in Pasadena, is donating its services to cover the logistics of transporting the orbiter from LAX to the museum grounds. The orbiter will have to be routed on streets that are not obstructed by freeway overpasses, Rudolph said. Rudolph said it would have been impractical for NASA to have Endeavour land at Edwards Air Force Base in California, because much of the equipment to detoxify the shuttle is in Florida. The $28.8 million being raised is a fraction of the $200 million needed to pay off a recent "Ecosystems" expansion of the Science Center and to fund a new Air and Space Center that will be home to Endeavour. Rudolph said the museum intends to display Endeavour at a temporary home after its arrival in Los Angeles. A more permanent home will take at least five years to design and construct. Web posted. (2011). [Space shuttle Endeavour not expected to arrive in L.A. until late 2012 [Online]. Available WWW: http://latimesblogs.latimes.com/ [2011 June 1].]

**Shuttle Endeavour's Next Mission: Getting Cleaned Up for Museum Life**

With its final space mission in the history books, the shuttle Endeavour begins preparations for a life of leisure as a museum showpiece. Endeavour touched down at NASA's Kennedy Space Center in Florida before sunrise today (June 1), bringing an end to its 16-day STS-134 spaceflight. Only one mission now remains for NASA's fleet of space shuttles: the STS-135 flight of Atlantis, scheduled to launch July 8. After a lengthy decommissioning process, Endeavour, the youngest orbiter in the fleet, should be ready to be shipped out west for display at the California Science Center in Los Angeles by next spring. NASA is retiring its space shuttle fleet after 30 years of spaceflight to make way for new deep-space missions aimed at visiting an asteroid by 2025 and Mars by the mid-2030s. Transforming Endeavour from a flight-ready shuttle into a museum specimen is an involved process that will take months. And it will begin almost immediately, NASA officials said. Shortly after landing, Endeavour was rolled into Orbiter Processing Facility No. 1 at Kennedy Space Center for technicians to begin removing supplies and cargo,

as they would following any shuttle mission. These activities should take several weeks, NASA officials said. When that's done, workers will begin the decommissioning process in earnest, taking some of Endeavour apart. They'll remove the thruster system inside the shuttle's nose, for example, as well as the big engines on either side of its tail. These parts will be shipped to a NASA facility in White Sands, N.M., for thorough decontamination. "This is for 'museum-clean,'" said Allard Beutel, NASA spokesman at Kennedy Space Center. "They're completely flushing out the system. Twenty years from now, we don't want some sort of piping to degrade and suddenly drip hydrazine [rocket fuel] on people." The parts will then be reattached to Endeavour at KSC, though the main engines will be replicas. NASA will keep the original ones, which could be useful references in the design or testing of new equipment, officials have said. The decommissioning work, while not old hat for NASA, is not unprecedented, either. The agency has already begun the transition work on the shuttle Discovery, which wrapped up its final mission, STS-133, in March. Discovery sits right next door to Endeavour, in Orbital Processing Facility No. 2, where it is being readied for display at the Smithsonian Air & Space Museum in Washington, D.C. Discovery should be ready for transport to the Smithsonian by January or February, Beutel said. De-commissioning work on Endeavour and then Atlantis will be finished shortly thereafter, in staggered shifts. Atlantis is bound for display at the Kennedy Space Center's Visitors Complex. New York City's Intrepid Sea, Air & Space Museum will get Enterprise, a prototype shuttle that made some glide tests but never reached space. When Endeavour is all scrubbed up and ready for display, it will hitch a ride to Los Angeles aboard a modified Boeing 747 carrier aircraft. This transport aircraft will have to refuel several times during the journey from Florida, Beutel said. NASA is considering turning the refueling stops into meet-and-greet sessions with the public, making Endeavour's last journey something of a farewell tour. But that's just an idea at the moment, not a definitive plan. "That's all very preliminary," Beutel said. "A lot of logistics would have to be worked out." A farewell tour would give more people a chance to know and appreciate Endeavour, which made 25 successful missions to Earth orbit and back. "I just love this vehicle," STS-134 pilot Greg Johnson told reporters yesterday. "This vehicle is a wonderful machine, and it's an honor and a privilege for each one of us to be part of her final flight." Web posted. (2011). [Shuttle Endeavour's Next Mission: Getting Cleaned Up for Museum Life [Online]. Available WWW: http://www.space.com/ [2011 June 1].]

**June 2: KSC crews prepare Atlantis for final launch**

Kennedy Space Center teams are preparing Atlantis and launch pad 39A for the final shuttle launch, including reviews to make sure nothing was damaged when lightning struck within a half-mile of the pad during storms that arrived hours after Atlantis Wednesday morning. The rotating gantry that shields the orbiter from weather and provides access for workers was closed this morning. Meanwhile, work is under way to begin "safing" Endeavour's hazardous systems after its final return from space early Wednesday. In the hangar called Orbiter Processing Facility-1, crews are draining residual cryogenic reactants from the fuel cell system powered the orbiter during its 16-day trip to space. The four astronauts flying the mission, led by Chris Ferguson, will visit KSC for a launch countdown dress rehearsal from June 20 to 23. Web posted. (2011). [KSC crews prepare Atlantis for final launch [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 June 2].]

**Cybersecurity, the next frontier for NASA engineers**

If one were to map where the nation's brightest science, technology, engineering and mathematics minds are concentrated, the epicenter might fall somewhere along an eastern stretch of central Florida known as the Space Coast. The region is best known for the Kennedy Space Center, the launching site of every human US space flight since 1968. June 28, however, will mark the space shuttle program's final mission, when Discovery propels into orbit. Any future voyages of that nature will be conducted by private firms, with NASA choosing to focus on deep-space exploration, with the eventual goal of landing on Mars. The retirement of the shuttle means the end, for now, of the dramatic liftoffs and landings, tragedies and triumphs that have come to define America's fascination with outer space. But it also signifies the end of something more tangible – the technology here on Earth that has emerged because of NASA's scientific

research. The agency is credited with scores of innovations, ranging from smoke detectors and power tools to crop dusters and chips for breast biopsies. Some of the most intellectually gifted Americans built those products – and now about 8000 of them are expected to be out of a job. But the aerospace industry's loss may be the cybersecurity market's gain, according to Deborah Kobza, president and CEO of the recently launched nonprofit Global Institute for Cybersecurity and Research (GICSR), founded last August. The goal of the nonprofit, located just across the street from the Kennedy Space Center, in a business center known as Exploration Park, is to advance cybersecurity education, innovation and research by providing the coordination of key players, and generating recommendations and actionable policy solutions. Not only is GICSR focusing on helping NASA workers transition to a career in cybersecurity – their skill sets make them a ripe fit for a career in network defense – but the group also views its mission as much broader. If successful, GICSR, enabled by the resources available at Kennedy Space Center, may help generate a new source of American pride that could have as lasting benefits as the innovations that grew from the space program. "One global industry and technology sector that represents urgent and critical research and workforce education needs and career opportunities across industry, government and academia is cybersecurity," Kobza says. "In addition to defining next-generation cybersecurity research, trusted tools and technologies, the demand for skilled security professionals is growing dramatically as businesses and governments continue to invest heavily in cybersecurity." It is no surprise that education is the chief component of GICSR's strategy. Studies have shown that there is a startling shortage of skilled cybersecurity professionals, both in government and the private sector. And those who do already work in the industry often lack the necessary skills to best do their jobs. Federal officials have estimated that the US government alone needs up to 30,000 security professionals, but only about 1000 are capable right now. The goal is to reach not only laid-off space shuttle workers, but also the current IT security workforce and students from kindergarten through college. The group already is working on a framework for health care – NASA can lend resources because it is well versed in handling electronic health records of employees – with plans to extend across all critical infrastructure sectors. To achieve its objectives, GICSR is working in concert with a slew of government entities, including NASA, the US National Institute of Standards and Technology, the US Department of Homeland Security and the US National Security Agency, as well as security certification companies and academia. The group is partnering with SAIC, a scientific, engineering and technology applications company, to take advantage of a 10-week CyberNEXS pilot training program, which provides a networking environment that simulates real-world operations. The space agency has both a lot to gain from and provide to GICSR. For starters, Kobza says, the group is supporting the transition of space shuttle workers, through collaboration with the Space Center, local workforce and academic organizations, training providers and certification bodies. In addition, NASA's location across the street from GICSR is providing a synergy that could yield valuable research and development for the security industry. The NASA Center for Lifecycle Design, best known for modeling and simulating space launches, also can extend to other industries. "Modeling and simulation is a cross-cutting technology that could be used for training, analysis and operations in a number of fields, including cybersecurity," says Priscilla Elfrey, a senior specialist in modeling and simulation outreach at Kennedy Space Center. Elfrey says the partnership with GISCR enables NASA to build on its highly developed workforce to identify areas in security where new technology is needed. This, in turn, raises awareness around the need for qualified security professionals. "If we can make people aware of cybersecurity as an employment field, and make it clear what it is you need to know to do that, and have GICSR with connections to people who hire, then I think there's a pathway to find jobs," she says. Among the capabilities of the GSAC, located at Exploration Park, are: *24/7 physical and cybersecurity situational awareness monitoring and analysis GIS; *Satellite imagery; *Two-way information sharing; *Modeling and simulation for mock disaster exercises; *Alert/warning notifications Incident response; * Countermeasure solutions; * Communications and crisis information management solutions; *Security protection and best practice solutions and *Education. Web posted. (2011). [Cybersecurity, the next frontier for NASA engineers [Online]. Available WWW: http://www.scmagazine.com.au [2011 June 2].]

**Hot Rod Magazine's Power Tour roars into Brevard**

Thousands of hot rods rumble into Brevard County starting today, a high-octane kickoff to the summer tourism season. Upward of 3,000 souped-up cars are expected in town -- most from out of the area -- for the start of the 17th annual Hot Road Magazine Power Tour, and more than 1,500 hotels rooms have been booked for the weekend, said Rob Varley, executive director of the Space Coast Office of Tourism. "It's going to be great," he said. "The PR tie to this, the national exposure we're getting, it was worth the event itself. It's going to be huge." The Power Tour is a seven-day, seven-city road trip that kicks off Saturday in Port Canaveral with a car show featuring thousands of hot rods and about 70 NASCAR-style, tractor-trailer rigs selling parts and wares. On Sunday, drivers will leave for Valdosta, Ga., as they head off on a 1,600-mile, seven-city tour that ends in Detroit on June 10. Kissimmee was a kickoff city a few years ago. Cocoa Beach-Port Canaveral is the only other Florida destination chosen as a kickoff city in the history of the tour. This year, the Power Tour's Sunday Drive feature involves the KSC Visitor Complex. Drivers will be able to loop around the Vehicle Assembly Building and tour Launch Complex 39A. They will motor past the countdown clock, the press site and orbiter processing facilities. Hot Rod magazine will film the tour for "Hot Rod TV," which airs on the Speed Network. A follow-up story will be printed in the magazine this year. Web posted. (2011). [Hot Rod Magazine's Power Tour roars into Brevard [Online]. Available WWW: http://www.floridatoday.com/ [2011 June 2].]

**June 3:** **Tweeters ... in ... spaaaace!**

Has it really been two years since a NASA astronaut sent down the first Twitter update from outer space? The online world has changed since then: Every shuttle crew member will be on Twitter for Atlantis' final flight, scheduled in July — for the first (and the last) time in the 30-year space shuttle program. But that's just one part of NASA's Twitter campaign. Thousands of Twitter users are waiting to find out if they'll be among the lucky 150 to take part in the space agency's last shuttle mission "tweetup." The tweetup tradition dates back two years as well, to a time even before astronaut Mike Massimino sent that first tweet from orbit ("Launch was awesome!!"). The event makes it possible for Twitter users of all stripes to take part in tours and briefings at NASA's Kennedy Space Center, and then see the launch in person from the press site. More than 4,000 Twitter users applied to be on hand for Endeavour's launch last month, and although the applications for the Atlantis tweetup still have to be fully sorted, NASA says the numbers of would-be tweeters is shaping up to be higher. NASA says it will release the list of 150 tweetup participants by June 10. The hashtag #NASAtweetup is already generating a new wave of buzz in anticipation of the mission, and the traffic will surely get heavier as the launch date approaches. Web posted. (2011). [Tweeters ... in ... spaaaace! [Online]. Available WWW: http://cosmiclog.msnbc.msn.com/ [2011 June 3].]

**June 4:** **Homemade Danish rocket takes off**

A home-made rocket built by two Danes successfully blasted off from a floating launch pad off the Danish Baltic island of Bornholm Friday, nine months after its first test flight failed due to a defective hair drier. The nine-meter (30-foot), 1.6-tonne rocket and its small capsule have taken space enthusiast Peter Madsen, former NASA employee Kristian von Bengtsson and an army of volunteers some three years to test and build. Last September, their first launch attempt failed when a hair drier designed to keep a valve from freezing failed. There had been fears that Friday's attempt would also go wrong when the unmanned rocket's automatic start sequence did not initiate, but after a new countdown began, all systems were go and at precisely 4:32 pm (1432 GMT), the rocket roared into the sky. It is not yet clear how far the rocket rose into the air and whether it reached the altitude of between 14 and 16 kilometers (8.9-9.9 miles) hoped for by the Copenhagen Suborbitals group. Web posted. (2011). [Homemade Danish rocket takes off [Online]. Available WWW: http://www.google.com/hostednews/ [2011 June 4].]

**June 5:** **SLS configuration nears decision point – Two-phase approach rejected**

A decision on the configuration of the Space Launch System (SLS) Heavy Lift Launch Vehicle (HLV) is just weeks away, as final evaluations take place into a "staged evolution of a single heavy launcher", after

NASA's leadership rejected the two-phase approach, which would have resulted in an open competition for the Beyond Earth Orbit (BEO) derivative of the SLS. The process to finalize the new path for NASA – following the cancellation of the Constellation Program (CxP) – remains under evaluation. The lack of a clear direction continues to burden the Agency, something which will continue to be the case even after the centerpiece rocket is revealed. Although the ultimate goal for the Agency's exploration plan is manned mission to Mars, no definitive roadmap has risen from the ashes of the Ares-based architecture, resulting in a path where a Heavy Lift vehicle is being designed before the missions it is set to cater for have been set in stone – something which often is pointed out as the wrong way around. Top level NASA meetings late last week once again emphasized their agreement with the HLV requirement in the Authorization Act – which was based on NASA input during its drafting – noting that all findings concur there are no real savings in multiple smaller launches, which they claim also increase risk. This vehicle, which continues to be tagged as the Design Reference Vehicle (DRV) for the purpose of the final report to lawmakers, will enable use of core elements, "initially" – the notes claim – utilizing Solid Rocket Boosters to allow the SLS to provide back-up in the 2016-early 2017 time-frame for the ISS support assurance – as requested in the Authorization Act. A definitive design and basic systems decision is expected before the end of June, even though these findings may lack the procurement and management strategy at that point. There is understood to be a hard deadline of July 8 – when Atlantis is scheduled to launch on the final Shuttle mission, STS-135. Web posted. (2011). [SLS configuration nears decision point – Two-phase approach rejected [Online]. Available WWW: http://www.nasaspaceflight.com/ [2011 June 5].]

**June 6: Honeywell receives $96 million contract from NASA's Safety Center**

Honeywell International Inc. said Monday that it has received a $96 million contract from NASA's Safety Center for safety and mission assurance services. The diversified manufacturing company said it will provide audits and assessments to NASA's centers and suppliers. Its HTSI subsidiary will provide safety and mission assurance support to NASA's headquarters, field centers, programs and projects and suppliers. Honeywell is based in Morris Township, N.J. Web posted. (2011). [Honeywell International receives $96 million contract from NASA's Safety Center [Online]. Available WWW: http://www.dailyjournel.net/ [2011 June 6].]

**Space shuttle Atlantis astronauts flying to Kennedy Space Center**

The final crew of space shuttle Atlantis is flying to Kennedy Space Center today. The crew will check part of the payload they will deliver to the International Space Station. Some crewmembers will also practice landings. Meanwhile, technicians are replacing part of space shuttle Atlantis' Window Contamination Control System (WCCS). Officials decided to remove and replace the left outboard WCCS dessicant following inspections and an engineering review board meeting last week. The repairs should be completed before the shuttle's tanking test next week. Managers said the repairs should not delay Atlantis' final launch date. Atlantis is expected to launch Friday, July 8 at 11:40 a.m. Web posted. (2011). [Space shuttle Atlantis astronauts flying to Kennedy Space Center [Online]. Available WWW: http://www.cfnews13.com/ [2011 June 6].]

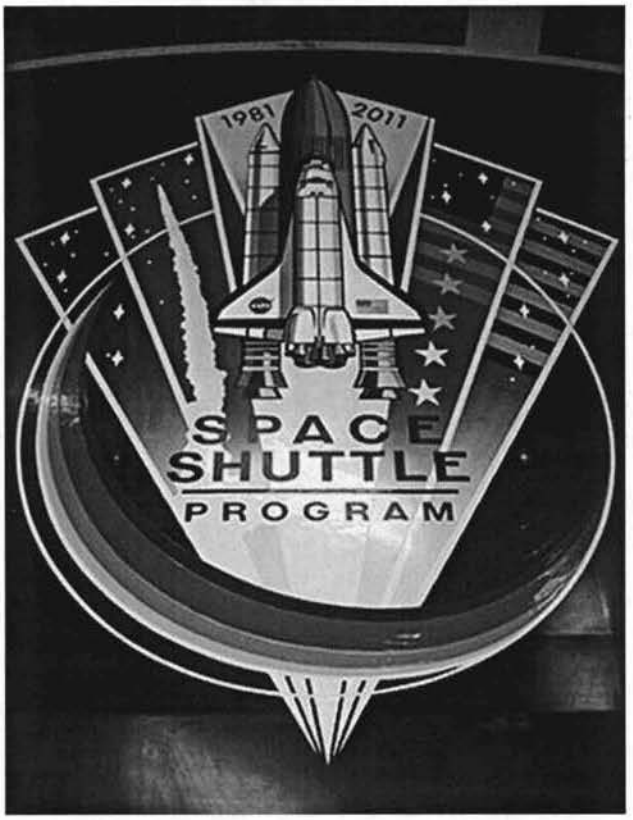
**Explore new worlds at Kennedy Space Center with 'Star Trek'**

They've explored strange new worlds and boldly gone where no man has gone before. And now, items from the "Star Trek" television shows and movies will be coming to Kennedy Space Center Visitor Complex. On Saturday, "Star Trek: The Exhibition," will begin a four-month run, including a massive display of sets, costumes and gadgets like phasers and communicators from more than four decades of "Star Trek." Visitors will get to sit in the chair that Capt. James T. Kirk, played by William Shatner, sat in when commanding the U.S.S. Enterprise, one of the artifacts that's part of an exhibit replicating the iconic command bridge set from the original "Star Trek" television series. They also can take a five-minute simulator ride, called "The Star Trek Shuttlecraft Simulator Adventure." "It's very important that we have something new," said John Stine, KSC Visitor Complex sales and marketing director, who expects the

exhibit to boost visitor complex attendance by 10 percent to 15 percent this summer. Stine sees the exhibit as a way to link the real-life story of the U.S. space program with one of the most popular science-fiction franchises in history, as well as a way to attract new visitors to the complex. The new attraction could help extend to two days their visit to the complex and its sister facility, the U.S. Astronaut Hall of Fame. Stine said the visitor complex is spending $1.5 million to bring the "Star Trek" exhibit to Brevard County, through a deal with CBS and Event Marketing Service, an Austrian-based company that works with CBS. That amount doesn't include the cost of marketing. There will be "Star Trek"-costumed characters at the complex to interact with visitors and guide them around the exhibits, and there is a 30-minute interactive "Star Trek Live" show, which debuted last year and remains as a permanent exhibit. The complex, which is operated for NASA by Delaware North Companies Parks & Resorts, is Brevard County's most popular paid tourist attraction, drawing 1.5 million visitors a year. Visitors to the Kennedy Space Center Visitor Complex's "Star Trek: The Exhibition" attraction this summer will have a chance to win a brief trip into space as early as 2012 aboard the two-seat XCOR Aerospace Lynx suborbital spacecraft. The total flight time aboard the Lynx vehicle is about 45 minutes, including about 2 minutes in space. The vehicle takes off and lands on a runway strip. The prize also includes a six-day, five-night hotel stay for two while the winner is trained for the flight. The training and the trip are valued at more than $100,000. Web posted. (2011). [Explore new worlds at Kennedy Space Center with 'Star Trek' [Online]. Available WWW: http://www.floridatoday.com/ [2011 June 6].]

**Final space shuttle to feature 'nose art'**

When the space shuttle launches on its final mission next month, it will be adorned with the same markings it has always been — the United States flag and the NASA logo — with one subtle but special addition. Launch spectators may find it difficult to see, but painted on an access door near the top of the shuttle's fuel tank will be 'nose art' paying tribute to the winged vehicles' 30 year legacy. It'll be only the second time in 135 missions that the space shuttle has lifted off with a commemorative emblem painted on its side. The colorful design, which was created and chosen earlier this year through a contest for NASA's past and present employees, has already been reproduced on medallions, embroidered cloth patches and t-shirts — some of which have already flown on board previous shuttle missions. This next and last launch however, will mark its premiere on the side of a spacecraft. But don't go searching for it just yet; even though space shuttle Atlantis arrived on the launch pad last week, the hand-painted hatch is still waiting to be installed on the fuel tank during the weeks leading up to liftoff, targeted for July 8. The logo, which was designed by an engineer at NASA's Johnson Space Center in Houston, depicts the shuttle set against a diamond-shaped background. Artist Blake Dumesnil described his emblem as having been inspired by how the shuttle has been "an innovative, iconic gem in the history of American spaceflight." His insignia's jewel-like facets fan out to "evoke the vastness of space and our aim to explore it, as the shuttle has done successfully for decades." The logo also evokes an old tagline for the vehicle. When the first shuttle launched in April 1981, it was dubbed "The Gem of the Galaxy." The central element of Dumesnil's logo, the space shuttle itself, is bounded by panels showing the U.S. flag and two sets of stars: 14 in memory of the astronauts lost aboard orbiters Challenger and Columbia and five symbolizing the shuttle fleet including Discovery, Endeavour and Atlantis. The emblem's jewel-shape is cradled by the outline of a blue circle, symbolizing the orbiter's realm in Earth orbit but also alluding "to the smoothness of the shuttle orbiting the Earth," according to Dumesnil. The artwork is finished with the inscription "Space Shuttle Program" and the years that the spaceplanes flew, "1981" through "2011." It was the second fuel tank door that Irving was tasked to paint. The first, which launched with Endeavour's final flight last month, featured artwork celebrating that tank's repair after being damaged by Hurricane Katrina in 2005. The last time the logo will be seen is when Atlantis' crew turns their cameras back at the tank as it falls away from the orbiter. Web posted. (2011). [Final space shuttle to feature 'nose art' [Online]. Available WWW: http://www.collectspace.com/ [2011 June 6].]




**June 7:** **Sachs/Mason-Dixon poll supports continued space exploration**

A poll released today by Ron Sachs Communications and Mason-Dixon Polling Research found that 57 percent of Americans believe that the U.S. should "continue to be a world leader in manned space exploration." For the poll, 625 adults were surveyed between May 23 and May 24 nationwide. There is a 4 percent margin of error. Following 2011, NASA is ending its space shuttle program. Space Shuttle Atlantis is slated to launch as the space shuttle program's final mission in July. However, NASA will still likely see billions of dollars in federal funding over the next several years. "Human space flight symbolizes American ingenuity, innovation and imagination and any effort to ensure our nation remains at the forefront of manned space flight is strongly supported by the American people," said Ron Sachs, President of Ron Sachs Communications, in a press release. "The American people are emotional about maintaining our nation's leadership in this important scientific endeavor." Web posted. (2011). [Sachs/Mason-Dixon poll supports continued space exploration [Online]. Available WWW: http://www.orlandosentinel.com/ [2011 June 7].]

**June 8:** **NASA salt-mapper poised for West Coast launch**

A salt-mapping NASA science instrument housed on an Argentinian-built satellite is about 24 hours from launching from the California coast. The $237-million Aquarius mission will map the concentration of salt, or salinity, on the surface of oceans around the world. Data from the minimum three-year mission will improve understanding of how small changes in salinity influence the cycle of water between oceans and atmosphere, and how climate change affects the pace of that cycle. The satellite known as SAC-D also includes seven other instruments from four nations: Argentina, Canada, France and Italy. It is scheduled to blast off from Vandenberg Air Force Base on a 128-foot-tall United Launch Alliance Delta II rocket at 10:20 a.m. EDT Thursday, the opening of a five-minute launch window. The Air Force's 30th Weather Squadron anticipates perfect conditions for launch. Kennedy Space Center's Launch Services Program is managing the launch, NASA's first since the failed Glory mission launched in March from Vandenberg on an Orbital Sciences Corp. Taurus XL rocket. About 60 KSC personnel are at

Vandenberg supporting the launch, along with about 40 Cape Canaveral-based ULA employees. Web posted. (2011). [NASA salt-mapper poised for West Coast launch [Online]. Available WWW: http://www.floridatoday.com/ [2011 June 8].]

**Mars rover launch may be delayed, NASA warns**

NASA's top watchdog warned Wednesday that the agency's next major mission to Mars, an SUV-sized science rover, could miss its fall launch date because of technical problems — a delay that would add more headaches to a project already late and over budget. Of particular concern is the possibility that the rover's drill bit could contaminate the rock and soil samples it obtains and undermine the prime mission of the Mars Science Laboratory, answering whether Mars could support life. Also worrisome to NASA Inspector General Paul Martin were problems with the rover's flight software and backup systems. These and other glitches could impact whether the $2.5 billion project, already at least $900 million over budget and two years late, launches on time from Kennedy Space Center. "Because of technical issues related to these three and other items, project managers must complete nearly three times the number of critical tasks than originally planned in the few months remaining until launch," noted Martin and his team in a 52-page report. Investigators also raised concerns about the rover's power output and whether it will be affected by a rough landing on the Martian surface, now planned for August 2012. Much is riding on the mission. The rover, dubbed "Curiosity," will scoop soil, drill into rocks and use 10 different scientific instruments to help scientists better understand the chemistry of the Martian surface and whether it ever was or could be habitable for microbial life. In response, NASA officials said they remained confident the rover would launch in late November or early December and added that they had fixed or were fixing problems identified in the report. If NASA misses its fall 2011 deadline, however, it'll be another two years before it can launch again, as the best chance to time the orbits of Earth and Mars comes around only every 26 months. The mission already missed its first attempt in 2009 because of the late delivery of several critical instruments. Though the report notes that NASA has solved many of its problems, it had concerns about three others. During testing of the rover, technicians found that "hydrocarbons from oil used during the manufacturing of the drill bits were being released and causing contamination of samples." NASA has said it has devised a fix to the problem: basically using software to filter out any bad information due to contamination. As for the flight software and backup systems, NASA told investigators that they "can be resolved after MSL has been launched," according to the report. Under the current plan, the rover would land on Mars in August 2012 and operate at least two years. Much larger than previous Mars rovers, Curiosity aims to travel up to 660 feet per day as it combs Martian rocks and soil for clues as to whether the Red Planet ever had conditions to support life. Web posted. (2011). [Mars rover launch may be delayed, NASA warns [Online]. Available WWW: http://www.orlandosentinel.com/ [2011 June 8].]

**Delta 2 rocket to launch oceanography craft Friday**

Launch of the Delta 2 rocket originally planned for Thursday morning from Vandenberg Air Force Base in California has been postponed 24 hours to sort through a software issue. Officials delayed the Delta 2 rocket launch carrying Argentina's SAC-D satellite with NASA's Aquarius oceanography instrument to allow engineers more time to sort through a software issue. A review of the flight program for steering the rocket through high-altitude winds found that the last few seconds of the profile got truncated and the team isn't sure why, a NASA spokesman explained. The time needed to examine the situation and determine how best to reload the software data meant a launch attempt wasn't feasible early Thursday. Friday's five-minute launch window opens at 7:20 a.m. local time (10:20 a.m. EDT; 1420 GMT). Weather forecasters predict another 100 percent chance of acceptable conditions at liftoff time. But the marine layer is expected to remain entrenched at Vandenberg, producing very low ceilings and restricted visibility with fog. Web posted. (2011). [Delta 2 rocket to launch oceanography craft Friday [Online]. Available WWW: http://www.spaceflightnow.com/ [2011 June 8].]

**June 9:** **Delta II, Aquarius blast off from Vandenberg**

A NASA science satellite designed to monitor the saltiness of the ocean surface is en route to orbit after blasting off from the California coast. A United Launch Alliance Delta II rocket lifted off from Vandenberg Air Force Base on time at 10:20 a.m. EDT. The early phases of flight proceeded without incident. Three strap-on solid rocket boosters burned out and separated one minute and 45 seconds into flight, and the first stage separated about five minutes in, as the vehicle accelerated past 10,000 mph. The rocket's second stage executed its first burn properly. The 16-foot-tall, Argentinian-built spacecraft carrying eight instruments including NASA's Aquarius, the primary instrument, was scheduled to separate from the rocket's second stage about 56 minutes after launch. The $287-million mission will map ocean surface salinity around the globe for three years. Web posted. (2011). [Delta II, Aquarius blast off from Vandenberg [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 June 10].]

**Bill Would Cut Pay For Laid-Off Shuttle Workers**

A bill pending before Florida Gov. Rick Scott would count severance pay for laid-off workers when calculating unemployment benefits, a policy that could affect thousands of NASA contractors sidelined by the space shuttle's retirement. If Scott, a Republican who supported earlier versions of the bill as it wound through the legislative process, signs the new law, known as HB 7005, the double-pay benefits would stop effective Aug. 1. NASA currently plans to launch its final space shuttle mission, STS-135, on July 8 and land on July 20. Two days later, prime shuttle contractor United Space Alliance (USA) intends to lay off about 1,900 of its workers in Florida. Delays launching Atlantis on its supply run to the International Space Station likely would affect when USA's layoffs take effect. Terminations after Aug. 1 would be subject to the new regulations, if Scott signs the bill. According to the Florida Agency for Workforce Innovation, the bill would eliminate unemployment benefits for a particular week if a claimant's severance pay is equal to or greater than his or her weekly benefit amount. If severance pay is less than the weekly benefit amount, the amount would be deducted from the unemployment compensation. Currently, Florida does not take into account severance pay when calculating unemployment benefits. Under the new bill, severance pay does not affect the total amount of benefits that can be paid on the claim, the agency's press office added. Web posted. (2011). [Bill Would Cut Pay For Laid-Off Shuttle Workers [Online]. Available WWW: http://www.aviationweek.com/ [2011 June 9].]

**June 10: Unions face uphill battle**

Labor unions, already in decline statewide and on the Space Coast, expect to lose even more members in Brevard County ¤this summer as NASA sheds contract workers at Kennedy Space Center in the wake of the shuttle program's conclusion. Since 2007, nearly 1,000 union members — a quarter of the union work force — have lost their jobs at KSC, where about a third of the workers belong to one of eight unions. And several hundred union members likely will be among about 2,000 workers to be laid off July 22, after the last shuttle flight. Statewide, the number of union workers has fallen by 90,000, or about 19 percent, since 2008, according to the Florida Agency for Workforce Innovation. The higher wages union workers receive on federal installations like KSC helps boost income levels and spending power across Brevard. The loss of that pay could magnify the already negative impact of the layoffs, experts suggest. "The loss of these jobs is beyond union versus non-union," said Sean Snaith, director of the Institute for Economic Competitiveness at the University of Central Florida. "It's going to be very difficult for the area to recover from the loss of both those blue-collar workers and those rocket scientists." Union leaders fear layoffs at KSC will reduce the strength of Brevard unions while eliminating forever the higher-paying jobs their members hold. A lingering question is whether attacks by some states on public workers unions will spread to the union employees who continue to work under federal contracts in the space program. As of last year, Brevard had about 7,200 people in AFL-CIO affiliated unions. That's about 4 percent of the county's work force. The bulk of them were in two areas: about 2,900 at KSC, and 2,659 were members of the Brevard Federation of Teachers. The remaining 1,604 work at Cape Canaveral Air Force Station or other union businesses. Statewide, the work force is 5.6 percent union, about half of the

national average. But as the shuttle program ends, those numbers are in flux. After shuttle Atlantis rockets skyward for the final time, a launch now scheduled for July 8, the unemployed union workers could be more likely to leave the county as they try to find jobs that pay the top wages they earned while working at KSC. Unions now anticipate a struggle to protect the pay and benefits of their remaining members as the shuttle work force is laid off. The electrical workers union, for example, has about 160 members employed by United Space Alliance, which expects to have the bulk of the post-shuttle layoffs, including more than 130 of those union workers. And NASA's plan to rely on commercial space companies to build the next generation of rockets does not promise to help union workers. Private companies, unlike federal contractors, have no obligation to accommodate union workers. While union electricians are familiar with being laid off and looking for new jobs, they face a job market hostile to union members. Many likely will choose to leave Brevard. Federal enclaves, such as KSC and the Cape Canaveral Air Force Station, traditionally have welcomed unions and have been encouraged to do so by federal regulations. The relationship between federal contractors and the unions they employ has generally been amiable. However, because of concern over the national deficit — and older economic arguments about the impact of unions — the acceptance of organized labor is waning in the U.S. "We tend to have better benefits and we tend to have better working conditions simply because we have the right to collectively bargain," said Kevin Smith, president of the Transport Workers Union, which represents 700 workers at KSC, the Air Force station and Patrick Air Force Base. "We are paid well, and we'd like to continue that." The union workers are firefighters, paramedics, supply technicians, ordinance technicians, and searchlight and generator operators at tracking sites. They also staff Transoceanic Abort Landing sites around the world during shuttle launches. The Transport Workers Union operates under about a dozen contracts with companies at KSC and the Cape, and past negotiations have not been tense. "Our relationships with those companies are fantastic," Smith said. Web posted. (2011). [Unions face uphill battle [Online]. Available WWW: http://www.floridatoday.com/ [2011 June 10].]

**Rocket launched from Wallops to test new tech**

NASA has launched a rocket from Virginia's Eastern Shore to test new technologies. The agency says the Terrier-Improved Orion suborbital sounding rocket was launched at 7:16 a.m. Friday from its Wallops Island Flight Facility. The launch was delayed a day after an unsuccessful attempt on Thursday due to a failed ignition caused by a short circuit in a ground electrical support system. The Small Rocket/ Spacecraft Technology platform, known as SMART, and the Autonomous Flight Safety System are among the technologies to be tested. NASA says it plans another launch of a Terrier-Improved Orion later this month to conduct educational experiments. The launch window is June 23 to June 29 between 6 a.m. and 9 a.m. Web posted. (2011). [VIRGINIA: Rocket launched from Wallops to test new tech [Online]. Available WWW: http://www.delmarvonow.com/ [2011 June 10].]

**Atlantis launch preps continue ahead of test**

At launch pad 39A this weekend, Kennedy Space Center teams will continue closing out the aft section of shuttle Atlantis in preparation for the targeted July 8 launch of the last shuttle mission. Early next week, focus will turn to preparations for a tanking test set to start at 7 a.m. Wednesday. During the test, more than a half-million gallons of supercold liquid hydrogen and liquid oxygen will be pumped into Atlantis' 15-story external tank and then drained. Starting next Saturday, engineers will spend up to a week taking X-ray scans of dozens of support brackets called "stringers" lining the tank's mid-section, or intertank, to make sure they withstood the cold temperatures and flexing from the tanking process. NASA ordered reinforcements to the stringers after some cracked on the tank that eventually flew safely with Discovery in February. Stringers surround an intertank access door that for only the second time will fly decorated with a hand-painted logo. The tank that flew with Endeavour last month carried an image that represented the tank's resurrection from damage it and New Orleans suffered during Hurricane Katrina. Atlantis' tank, labeled ET-138, sports a logo commemorating the end of the shuttle program, the winner of a patch design contest last year. Blake Dumesnil, an engineer at Johnson Space Center in Houston, designed the logo. Jon Irving, a Lockheed Martin graphic artist who works at NASA's Michoud

Assembly Facility in New Orleans, painted it on the door. Web posted. (2011). [Atlantis launch preps continue ahead of test [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 June 10].]

**June 11: STS-134: Endeavour's brake fire proving to be a mystery**

As engineers continue to safe Endeavour, following her highly successful final mission, an investigation into the observed brake fire – as the orbiter came to a stop on the Shuttle Landing Facility (SLF) runway – is struggling to find a specific root cause. Elevated to the Flight Readiness Reviews (FRRs), the STS-134 incident is classed as a situation that would not be catastrophic and should not happen again. A large amount of work is being carried out on Endeavour inside her Orbiter Processing Facility (OPF-1), as post mission safing and initial deservicing work is carried out on the now-retired orbiter. Engineers have already removed the "44 door" for midbody access, removed the Waste Containment System (WCS) and are continuing with the removal of the numerous cameras on the Remote Manipulator System (Shuttle Robotic Arm). The main focus of work over the next few days revolves around the preparations to remove Endeavour's Forward Reaction Control System (FRCS) – which will eventually be shipped to White Sands – and the dome heat shields around Endeavour's three Space Shuttle Main Engines (SSMEs). "The PLBDs (Payload Bay Doors) were opened earlier in the week. "The SSME controller was powered up to troubleshoot a Low Pressure Fuel Turbo Pump (LPFTP) discharge pressure transducer that failed low during ascent. Troubleshooting was unable to recreate the anomaly. The sensor will be removed and taken to the design center for further analysis." Pratt & Whitney Rocketdyne/KSC – who care for the engines that may find themselves with a role on the Space Launch System (SLS) – also noted that an X-Ray took place on the sensor, which also found nothing amiss. "No anomalies have been found so far during testing," confirmed their notes on the Standup report. "The sensor was removed and sent for x-rays. A micro-focus X-ray was performed, and no anomalies were found." SSME dome heatshield and body flap carrier panel removal began on Friday, while the heatshield removal will continue through the weekend. Engineers are continuing to evaluate the observations of a small fire – lasting around 40 seconds on one of Endeavour's Left Main Landing Gear breaks – at the end of the braking period as the orbiter came to a stop on the SLF after landing. With engineers removing the tire/wheel from the left hand inboard landing gear, before performing a thorough inspection, no real indications of a fire have been observed. Even a couple of strips of plastic tape in the location showed no indications of being over heated, which is highly unusual for an incident of this nature. The next step was to apply hydraulic pressure to the brakes to see if there are any signs of a hydraulic leak. It was expected that a very small hydraulic leak would be observed, leading to a potential root cause. However, the checks came back nominal. So far engineers have found no obvious evidence of the fire, and the hydraulic pressurization test of the brake pucks did not show any leakage, meaning the event may be classed as an Unexplained Anomaly (UA). Web posted. (2011). [STS-134: Endeavour's brake fire proving to be a mystery [Online]. Available WWW: http://www.nasaspaceflight.com/ [2011 June 11].]

**June 13: Tiny tracking site plays gigantic role in space launches**

Before Atlantis lifts off on the final shuttle flight, a tiny, little-known team of experts from Patrick Air Force Base will spring into action on a remote, somewhat mysterious island in the southern Atlantic Ocean. A mere blip on the globe, many local space workers and military personnel have gone to live on the picturesque, but mostly desolate island during five-plus decades to handle critical tracking and communications for hundreds of important U.S. space missions -- from the trail-blazing early missile shots, to John Glenn's first orbit of Earth, to the Apollo moon shots, and the shuttle missions that delivered science and military craft to space and later built the International Space Station. Among its many roles is one that's about to be done for the last time this summer: tracking the space station, as it zooms around the Earth at more than 17,000 mph to help pinpoint the precise window of time during which a shuttle launching from Kennedy Space Center needs to take off in order to rendezvous in orbit. In addition to launch-tracking and data-relay, Ascension's wide-ranging roles during shuttle missions include tracking and communications during the orbiters' re-entries and landings as well as preparing the island's

air strip as one of many emergency landing sites around the world. "The mission at Ascension will not change with the retirement of the shuttle," said Col. Denette Sleeth, commander of the 45th Operations Group at Patrick Air Force Base. In fact, little will change in the day-to-day operations on the island or its important role in the space program and national security. Among the other duties of the military and contractor personnel on Ascension are surveillance of spacecraft in orbit, rocket pieces left over after blastoff and slowly falling back into the atmosphere, and other space debris that could endanger important satellites or even the crew of the space station. Post-shuttle, they'll also continue tracking the space station, launches of military craft, spy satellites and space probes from Cape Canaveral and someday again the flights of U.S. astronauts on exploration missions to asteroids, the moon, or other destinations beyond Earth's orbit. The island itself is home to nearly 850 people, including Detachment 2 personnel with about 60 U.S. citizens and more than 200 contract workers -- some of whom previously worked on Florida's Space Coast for contractors or the military or are on temporary assignment from here -- and others from neighboring St. Helena Island. The airfield has served as a refueling and rest stop for long ocean-crossing transport flights for decades, beginning in World War II. It also assists with global navigation and communications systems. More than 450 aircraft landed and took off from the airfield between October and May, including military, government and even civilian flights, from both the United States and the United Kingdom. The two countries jointly operate the air base. At only 35 square miles, Ascension's just slightly larger in land mass than Merritt Island, and is among the most remote space-program posts anywhere. Volcanic in landscape and desolate in appearance from above, the island is surrounded by deep-blue waters as far as anyone can see. Almost everyone who lives on the island is associated with -- or supports -- the air station, the British Royal Air Force, the British Broadcasting Corporation and other organizations there. Ascension is a British overseas territory and falls under United Kingdom jurisdiction. The UK's British Forces Ascension Island Base is home to 17 Royal Air Force personnel and 180 contractor workers, sharing operation of the airfield with U.S. military and civilian personnel. The closest neighbor to Ascension Island is the island of St. Helena, which is accessible only by boat. The islands are part of the British Overseas Territory that also includes the island group of Tristan da Cunha. Web posted. (2011). [Tiny tracking site plays gigantic role in space launches [Online]. Available WWW: http://www.floridatoday.com/ [2011 June 13].]

**NASA to Launch Robot Gas Station Experiment on Final Shuttle Flight**

Tucked amid the other gear inside the cargo bay of NASA's last space shuttle to fly will be a novel experiment: a robot gas station for spacecraft that, if successful, could change how satellites are designed. NASA engineers are packing up the so-called Robotic Refueling Mission hardware and other equipment for delivery to the International Space Station on the shuttle Atlantis, which is set to fly July 8. The flight, STS-135, is NASA's last-ever shuttle mission to the station before the 30-year-old orbiter program is retired for good. Normally, when a satellite is launched into orbit it, is already carrying all the fuel for its entire mission onboard. Once that fuel runs out, the satellite's life is effectively over. That fact makes it tough for old satellites — as well as craft launched into the wrong orbit and ones that suffer a malfunction — to keep working. But this new in-space refueling project could change things. Developed by NASA's Goddard Space Flight Center in Greenbelt, Md., the Robotic Refueling Mission experiment will include a set of tools that could not only gas up satellites in space, but also perform minor repairs. This system's first test will be performed on the space station using the orbiting lab's Canadian-built Dextre robot to check its feasibility. The refueling test hardware includes simulated caps, valves, external thermal blankets and ethanol fuel, experiment designers said. Web posted. (2011). [NASA to Launch Robot Gas Station Experiment on Final Shuttle Flight [Online]. Available WWW: http://www.space.com/ [2011 June 13].]

**White Sands Space Harbor will permanently close in August**

The White Sands Space Harbor, the landing site for the STS-3 in 1982, will be closing its doors after 35 years due to the end of the space shuttle program; the last launch is scheduled to take place in July. Several NASA officials from Houston and a handful of astronauts were present during an unofficial

ceremony June 13 that honored the long hours and hard work White Sands Space Harbor employees contributed to shuttle missions and extensive astronaut pilot training. Robert Mitchell, WSSH manager, said the organization will officially shut its doors in August so it can remain an alternate landing site for the last shuttle launch. Mitchell said the WSSH employees will either retire or will have other jobs waiting for them on the range. As for the space harbor equipment, Mitchell said what the range doesn't take ownership of will go back to NASA and some of it will be given to Holloman or General Service Administration excess. Web posted. (2011). [White Sands Space Harbor will permanently close in August [Online]. Available WWW: http://www.alamogordonews.com/ [2011 June 25].]

**June 14: Shuttle's End Leaves NASA a Pension Bill**

The nation's space agency plans to spend about half a billion dollars next year to replenish the pension fund of the contractor that has supplied thousands of workers to the space shuttle program. The shuttle program accounts for a vast majority of the business of United Space Alliance, originally a joint venture of Boeing and Lockheed Martin. With the demise of the shuttle program, United Space Alliance will be left without a source of revenue to keep its pension plan afloat. So the company wants to terminate its family of pension plans, covering 11,000 workers and retirees, and continue as a smaller, nimbler concern to compete for other contracts. Normally, a company that lost a lifeblood contract would have little choice but to declare bankruptcy and ask the federal insurer, the Pension Benefit Guaranty Corporation, to take over its pensions. But that insurer limits benefits, meaning not everyone gets as much as they had been promised. United Space Alliance's plan also allows participants to take their pensions as a single check and includes retiree health benefits, neither of which would be permitted by the pension insurer. United Space Alliance, however, has a rare pledge from a different government agency to pay the bill. The National Aeronautics and Space Administration says in its contract with the company that it will cover its pension costs "to the extent they are otherwise allowable, allocable and reasonable." NASA interprets this to include the cost of terminating its pension plans outside of bankruptcy. The pension fund now has about half the amount needed. The president's budget proposal for the 2012 fiscal year requests $547.9 million for NASA to provide the rest. That is nearly 3 percent of the agency's total budget and just about what the Science Mission Directorate at NASA spent last year on all grants and subsidies to study climate change, planetary systems and the origins of life in the universe. "We know that it's NASA's obligation to fund this, and NASA will do so," said a spokesman for the space agency, Michael Curie. Other federal agencies have made promises to pay contractors' annual pension costs — the Energy Department, for example, for companies that run nuclear sites — and some government auditors have been warning for years that investment oversight was lacking and that the potential costs had been underestimated. This appears to be the first time, though, that a company's main contract has expired and an agency has had to bear the cost of terminating its plans. Although NASA was reimbursing the contractor for the annual pension contributions, it had no say over how the money was invested. United Space Alliance put most of the money into stocks. The backstop will be unusually costly because of market conditions. While United Space Alliance has made its required contributions every year, the fund lost nearly $200 million in the market turmoil of 2008 and 2009. When interest rates are very low, as they have been, the cost of the promises rises rapidly as well, creating a bigger shortfall. The cash infusion is also being readied at a time when some members of Congress are demanding cuts in spending and threatening to block anything that could be construed as a taxpayer bailout. "It's unfortunate that it's coming in this fiscal environment," said Bill Hill, NASA assistant associate administrator for the space shuttle. He said that he hoped Congress would appropriate the money before the fiscal year ended on Sept. 30. If not, he said, NASA will have to divert funds from space-related activities. Already, United Space Alliance has had five rounds of layoffs and has shrunk to about 5,600 employees from a peak of 10,500. Its workers have performed a wide range of jobs for the space shuttle program, mostly in Florida. Beth Robinson, chief financial officer of NASA, said that even if United Space Alliance declared bankruptcy at this point, the pension agency would go after NASA for some of the cost. She said the contract was issued during a stock market boom, with a clause saying that if the plans should terminate with a surplus, the extra money would go to NASA. At the time, no one expected them to terminate with

a deficit. The cost of the termination may fluctuate along with market conditions as Congress considers what to do. Web posted. (2011). [Shuttle's End Leaves NASA a Pension Bill [Online]. Available WWW: http://www.nytimes.com/ [2011 June 14].]

**NASA Spacecraft to Make Cross Country Voyage**

NASA is inviting the public to view a test version of the agency's next spacecraft that will carry humans into deep space. The Multi-Purpose Crew Vehicle, which NASA announced last month would be the agency's deep space crew module based on the original work on the Orion capsule, will make three stops as it travels by truck from NASA's Dryden Flight Research Center in California to the Kennedy Space Center in Florida. The planned stops are June 15-16 at the Pima Air and Space Museum in Tucson, Ariz.; June 19-20 at the Bob Bullock Texas State History Museum in Austin, Texas; and June 24-25 at the Tallahassee Challenger Learning Center in Florida. The module also will be on display June 29-July 4 at the Kennedy Space Center Visitor Complex. During a test flight in New Mexico last year, a new launch abort system propelled the spacecraft off the launch pad to a speed of almost 445 mph in three seconds. The spacecraft then parachuted to the desert floor. The test module eventually will be moved to Kennedy's Operations and Checkout Facility for further study. The Multi-Purpose Crew Vehicle's propulsion, life support, thermal protection and avionics systems ultimately will enable astronauts to travel for extended deep space missions and return safely to Earth. ["NASA Spacecraft to Make Cross Country Voyage," **NASA Media Advisory #M11-121,** June 14, 2011.]

**Memo Marks Official End of Constellation**

A senior NASA official has signed the formal death warrant for the Constellation deep space exploration program even as work proceeds on one of Constellation's legacy development efforts and agency officials continue to ponder the fate of another. "I have signed the letter to close out the Constellation Program," Douglas Cooke, associate administrator for NASA's Exploration Systems Mission Directorate, wrote in a June 10 memo. With Constellation's demise now official, the Constellation project office, which "has already scaled back in size significantly," will be charged "with transitioning contracts, etc. to the new [Space Launch System] and [Multi-Purpose Crew Vehicle] programs," Cooke wrote in the memo. NASA spokesman Michael Braukus confirmed June 10 that the letter came from Cooke. The fate of some Constellation contracts remains unclear, as NASA has not decided whether to use those contracts to build the Space Launch System, a heavy-lift rocket with a 130-ton lift capacity that Congress ordered the space agency to construct in the NASA Authorization Act of 2010. Boeing Space Exploration, Houston, ATK Aerospace Systems, Magna, Utah, and Pratt & Whitney Rocketdyne, Canoga Park, Calif., hold contracts to build key components of the now-canceled Ares 1. NASA is expected to make a decision on the design of the congressionally mandated heavy-lifter sometime in the coming weeks. The Multi-purpose Crew Vehicle, also mandated by the 2010 authorization act, is the space capsule formerly known as Orion. Orion was designed as part of Constellation and NASA said in May that it would adapt the vehicle to fulfill Congress' mandate for a new U.S. crew transporter. Lockheed Martin Space Systems of Denver holds the contract to build the capsule. Web posted. (2011). [Memo Marks Official End of Constellation [Online]. Available WWW: http://www.spacenews.com/ [2011 June 14].]

**June 15: Weather delays start of Atlantis tanking test**

Storms Tuesday have pushed back the expected start of this morning's shuttle tanking test at Kennedy Space Center to 11 a.m. The loading of Atlantis' 15-story external tank with a half-million gallons of liquid hydrogen and liquid oxygen had been scheduled to start at 7 a.m. NASA reported three lightning strikes within a quarter-mile of launch pad 39A yesterday, but don't believe any damage was caused to Atlantis or the pad. The pad's rotating gantry has been opened in preparation for the test, revealing Atlantis as if it were nearing launch. Today's test will verify the condition of support beams lining the tank's mid-section, the tops of which were reinforced after some cracked on an earlier tank. The results could take up to a week to confirm following a series of X-ray inspections of the beams. Atlantis is targeted to launch the final shuttle mission at 11:26 a.m. July 8. Web posted. (2011). [Weather delays start

of Atlantis tanking test [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 June 15].]

**Last Ever Shuttle to Haul Raffaello Logistics Module to the ISS**

The Space Shuttle Era will soon come to a bittersweet close with the final scheduled flight by the Space Shuttle Atlantis, dubbed the STS-135 mission. Atlantis is slated to blast off on July 8 from the Kennedy Space Center in Florida at about 11:38 a.m. The veteran crew comprises just a quartet of astronauts led by Shuttle Commander Christopher Ferguson. Joining him are Pilot Doug Hurley and Mission Specialists Sandy Magnus and Rex Walheim. The primary goal of the STS-135 flight is to haul the "Raffaello" multipurpose logistics module (MPLM) up to the International Space Station. The 21 foot long cylindrical module is mounted inside the shuttle cargo bay during launch and landing. Raffaello is a space 'moving van' and loaded with some 5 tons of critical supplies, spare parts and science equipment to stock up the station before the shuttles are retired forever, despite the fact that they have many years of service life remaining. "We are holding Raffaello open until the last possible moment so that we get every possible final piece of station hardware and supplies shipped here and stowed inside before we close up the module and put it into the payload canister. We have no plans to get into the MPLM once it is out at the pad," Howard Smith, a NASA mission project engineer for the International Space Station (ISS), stated. During the 12 day mission, the astronauts will pluck Raffaello out of Atlantis's cargo bay with the robotic arm and temporarily berth the module at a docking port on ISS Node 2 on Flight Day 4. The crew will then spend several days aggressively transferring the logistics supplies to storage spots aboard the orbiting complex. The fresh supplies are being brought aloft now by Raffaello to beef up the ISS with sufficient provisions to insure that the station can continue to fully function with a six person crew while NASA waits for the commercial space providers - SpaceX and Orbital Sciences - to successfully come online. These new and privately developed rockets and cargo vehicles must take over the cargo delivery services formerly performed by NASA's three shuttle orbiters or the ISS will enter a dire situation. The smaller Russian Soyuz Progress resupply spacecraft will be the primary means of cargo resupply after the Shuttles. If the cargo delivery flights of the commercial providers are delayed, the station partners could be forced to cut back on the ISS crew staffing or even abandon the ISS in a worst case scenario. That's why the STS-135 mission is so critical and was desperately sought for approval by NASA management. STS-135 was only added to the shuttle flight manifest in January 2011 as Washington politicians wrangled tumultuously over the NASA budget and strategic priorities throughout the past year. Raffaello is one of three MPLM's, all built by the Italian Space Agency and handed over to the US in exchange for flying Italian astronauts and experiments to the orbiting lab complex. "This is the last opportunity to use an MPLM to ship equipment to the ISS so we are closing Raffaello out at the last possible moment. Altogether, Raffaello is carrying up about 10,000 pounds of payloads when fully loaded," Smith explained. All these logistics and crew provisions carried aloft by the STS-135 mission will supply the station residents for about 1 year. The Russians are providing about 50% of the food. "Raffaello is the last train out of here!" Smith said, referring to the imminent retirement of the Space Shuttle program and the importance of the STS-135 flight to the stations future. Web posted. (2011). [Last Ever Shuttle to Haul Raffaello Logistics Module to the International Space Station [Online]. Available WWW: http://www.spaceref.com/ [2011 June 15].]

**Atlantis fuel tank being drained**

Kennedy Space Center crews are wrapping up shuttle Atlantis' tanking test today by draining more than a half-million gallons of supercold propellants from the 15-story external tank. Preliminary inspections showed no sign of damage to support beams lining the tank's midsection, which were the target of the test. Starting Saturday, X-ray-like inspections will begin to look below the foam's surface for potential cracks on the side of the tank facing the orbiter. Today's test did turn up what would have been a show-stopper on a real launch day, unrelated to the stringers. A fuel valve on one of three shuttle main engines showed lower than normal temperatures, possibly signaling a leak of liquid hydrogen. The engine was isolated and the test proceeded. NASA says Atlantis could still make a targeted July 8 liftoff if the valve

needs to be replaced at the launch pad. Web posted. (2011). [Atlantis fuel tank being drained [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 June 15].]

**IBM: 100 years of 'think'**

International Business Machines turns 100 today without much fanfare. IBM dates to June 16, 1911, when three companies that made scales, punch-clocks for work and other machines merged to form the Computing Tabulating Recording Co. The modern-day name followed in 1924. The force behind IBM's early growth was Thomas J. Watson Sr. Watson, and later his son, Thomas Watson Jr., guided IBM into the computer age. Its machines were used to calculate everything from banking transactions to space shots. Web posted. (2011). [IBM: 100 years of 'think' [Online]. Available WWW: http://www.floridatoday.com/ [2011 June 15].]

**June 16: KSC crews plan to replace Atlantis engine valve**

NASA expects Atlantis to stay on track for a July 8 launch of the final shuttle mission while Kennedy Space Center crews replace a main engine fuel valve that failed during Wednesday's tanking test. The valve replacement work will begin Monday and be completed within a week, including leak tests and closeout of the engine area, according to a KSC spokesperson. The main fuel valve on one of three shuttle main engines showed low temperatures during the test, signaling a possible leak of liquid hydrogen. "We found a little bit of a leak in one area," astronaut Chris Ferguson, commander of the final mission, told reporters today at Mission Control in Houston after an ascent simulation. "We're going to go back and fix that in the course of the normal flow. Hopefully it will preserve our current launch date." The leak would have scrubbed a real countdown, disappointing hundreds of thousands of visitors expected to gather on the Space Coast for the launch. Ferguson said the upcoming repair work at launch pad 39A was "living proof that we have the same capabilities we've always had" despite the loss of thousands of shuttle contractors in recent months or soon in layoff planned after Atlantis lands. The four-person veteran crew of Atlantis -- also including pilot Doug Hurley and mission specialists Sandy Magnus and Rex Walheim -- will fly into Kennedy around Monday afternoon for training that culminates in a complete launch dress rehearsal Thursday. An official launch date and time will be set during a flight readiness review scheduled June 28, just two days after the engine valve replacement work should be completed. At the same time the valve work is going on, additional teams will be scanning support beams on the mid-section of Atlantis external tank to make sure there are no cracks, which was the purpose of this week's tanking test. The launch processing schedule has several contingency days available over the July 4 holiday weekend to handle problems without delaying a July 8 launch. Web posted. (2011). [KSC crews plan to replace Atlantis engine valve [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 June 16].]

**Final shuttle payload heads to launch pad today**

The primary payload for the final shuttle mission is expected to begin rolling toward Kennedy Space Center's launch pad 39A at 9 p.m. today. A 48-wheeled transporter will haul a 60-foot-tall, environmentally controlled canister holding a cylindrical module packed with more than 8,000 pounds of supplies and parts bound for the International Space Station. The flight will be the fourth since 2001 for the Italian-built "moving van" named Raffaello. A sister module named Leonardo flew eight times before being left on the station as a permanent addition in February. Technically called a Multi-Purpose Logistics Module, or MPLM, Raffaello measures 21 feet long and 15 feet in diameter. A separate cargo carrier also will be installed in Atlantis' payload bay behind Raffaello, holding a box that will be installed on the station for tests of in-orbit refueling technologies. On the way down, it will carry a station coolant system pump module that failed last summer and will return to Earth for analysis. The cargo is scheduled to be lifted into a changeout room in the launch pad's rotating gantry Friday morning and be installed in the payload bay Monday -- the same day four Atlantis astronauts fly into KSC for a countdown rehearsal and other launch training. Atlantis is targeted to launch at 11:26 a.m. July 8. An official launch date will

be confirmed June 28. Web posted. (2011). [Final shuttle payload heads to launch pad today [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 June 16].]

**Air Force to merge missile ranges**

An Air Force proposal to bring the Eastern and Western Missile Ranges under one management structure holds unknown changes for the 900 employees who help operate the Eastern Range from headquarters at Patrick Air Force Base and along the East Coast. The Air Force, however, has told one expected bidder that it did not want to see a reduction in the work force, 500 of whom are located in Brevard County. "In this cost-conscious world, it is imperative that we embrace increased efficiencies and yet remain responsive to keep the launch ranges 100 percent mission-ready," said retired Brig. Gen. Greg Pavlovich, former commander of the 45th Space Wing, who will lead Boeing's pursuit of the $3.8 billion Launch Range Consolidation Contract. Consolidation might help the ranges upgrade more quickly to handle the expected increase in commercial launch business, said Frank DiBello, president of Space Florida, the state agency that supports the space industry. Consolidation also could speed technology improvements, such as the switch to GPS tracking from tracking by radar dishes. The Air Force is expected to request proposals to consolidate the existing operations and maintenance, systems engineering and sustainment work. The 45th Space Wing at Patrick Air Force Base operates the Eastern Range, which includes Cape Canaveral Air Force Station; the 30th Space Wing at Vandenberg Air Force Base in California operates the Western Range. Web posted. (2011). [Air Force to merge missile ranges [Online]. Available WWW: http://www.floridatoday.com/ [2011 June 16].]

**NASA's new crew capsule en route to KSC**

NASA's prototype multi-purpose crew vehicle is making a cross-country tour, with several public viewing stops, on its way to Kennedy Space Center. The vehicle, a test module based on Lockheed Martin's Orion capsule design, will make three stops as it travels by truck from Dryden Flight Research Center in California to KSC: June 15-16 at the Pima Air and Space Museum in Tucson, Ariz.; June 19-20 at the Bob Bullock Texas State History Museum in Austin, Texas; and June 24-25 at the Tallahassee Challenger Learning Center. The test module will be displayed June 29-July 4 at the Kennedy Space Center Visitor Complex before moving to KSC's operations and checkout facility for further study. Web posted. (2011). [NASA's new crew capsule en route to KSC [Online]. Available WWW: http://www.bizjournals.com/ [2011 June 16].]

**June 17: NASA's new rocket looks a lot like its old one**

As soon as next week, NASA will announce the design for its next big rocket, and anyone who has seen the space shuttle should recognize the key pieces — as the vehicle includes much of the same 30-year-old technology. Like the shuttle, the new rocket will use a giant fuel tank and a pair of booster rockets. The major difference is that the airplane-like orbiter is gone, replaced by a new Apollo-like crew capsule atop the fuel tank, according to industry sources and internal NASA documents. That NASA selected this model is not a complete surprise: a 2010 law all but requires agency engineers to reuse shuttle parts or remnants from the now-defunct Constellation moon program, and the design does that. But it also commits the agency's future to hardware — like the main engines taken from the space shuttle — that was designed in the 1970s. Officially, NASA officials said that the design still was under review. An administration source, not authorized to speak on the record, said that Bolden had approved the design but that the White House had yet to approve the plan as of Friday afternoon. The decision finally enables NASA to move forward with its manned-space program, ending a period of limbo since President Barack Obama moved in February 2010 to cancel the troubled Constellation moon-rocket project that was over budget and years behind schedule. NASA's long-term goal is Mars, but the agency acknowledges that sending a human to the Red Planet won't happen for decades. It hasn't settled on an interim destination — the moon and a nearby asteroid are mentioned — and the estimated $14 billion set aside over the next five years may not be enough to build the rocket, let alone the related equipment needed to actually land somewhere. Cost estimates for the new rocket were not immediately available, although NASA warned

in January that it would not have enough money to build it by a congressionally imposed deadline of 2017. Under the current plan, NASA would launch a smaller version of the Space Launch System using the same solid-rocket boosters — made by Alliant Techsystems of Minnesota — that powered the shuttle. Then the agency would hold a competition for boosters that would power a larger model of the rocket. The decision follows heavy pressure in recent weeks from California and Alabama lawmakers, who have written NASA chief Charlie Bolden asking that he compete this part of the rocket. Getting NASA flying again soon is critical for Kennedy Space Center, which faces an estimated 7,000 lost jobs once the 30-year shuttle era ends with the planned July 8 launch of Atlantis. Web posted. (2011). [NASA's new rocket looks a lot like its old one [Online]. Available WWW: http://www.orlandosentinel.com/ [2011 June 17].]

**June 18: Pride, sadness tug at Atlantis payload teams**

The last heavy load a shuttle will haul into space was hoisted high above a Kennedy Space Center launch pad Friday, three weeks before its planned blastoff with Atlantis. The roughly 25,000-pound cargo container Atlantis will fly to the International Space Station next month is a relatively routine payload by shuttle mission standards. But its significance may be felt long after Atlantis returns home to end the shuttle program, after a 12-day flight targeted to launch July 8. NASA wants to stock the station with enough supplies to last a year, so a crew of six can continue research in orbit even if new commercial spacecraft aren't ready to deliver cargo as planned early next year. "It's very important that we buy ourselves a little more time to help our commercial partners," said Joe Delai, the NASA payload manager for the mission. The shuttle is one of four international vehicles currently shipping cargo to the station, but by far the biggest. An unmanned Russian craft scheduled to launch Tuesday from Kazakhstan will ferry up nearly 3 tons of food and supplies. Roughly double that mass is packed into the Italian-built module, nicknamed Raffaello, that Atlantis will carry. Contents of the 21-foot-long, 15-foot-diameter module include nearly 2,700 pounds of food, 800 pounds of clothing and other provisions, 1,000 pounds of science experiments and thousands more pounds of spare components. But that's not all Atlantis will fly. A nearly 3,000-pound carrier holding an experiment for testing orbital refueling technologies will be stowed behind the module in the payload bay, and another ton of stuff will be packed in the orbiter's mid-deck. The "up mass" is critical, but Atlantis is also the last vehicle that can return any significant quantity of cargo down to Earth until SpaceX's Dragon capsule begins flying. Nearly 5,000 pounds of trash, unneeded equipment and science experiment samples will return in Raffaello, and a failed station coolant pump will ride home in the payload bay. Like so many milestones leading up to the last mission, preparation of the last payload was bittersweet for the teams involved. In the vast KSC high bay where large station hardware has been readied for flight, a handwritten sign taped on a railing around the Raffaello module last week succinctly summed up the situation. "STS-135: The End!" it read, referring to NASA's label for the 135th and last shuttle mission. The Boeing Co. team that processed the payloads numbered about 200 people at its peak. It's now down to about 100 and will drop to 30 or 40 after the Atlantis mission. Mike Kinslow, Boeing's payload manager, said teams pulled extra hours and shifts to ready the Atlantis cargo even as some received layoff notices. "I've been encouraged with the esprit de corps, the professionalism that our team has exhibited," he said. "This is in their blood. This is what they've done. They're not letting up one iota to get successful missions." The Raffaello module was packed differently than usual and in a more compressed timeframe to allow for some late-arriving station parts, increasing the challenge, Kinslow said. Raffaello and the refueling experiment are expected to be installed in Atlantis' payload bay Monday, which is shaping up as a busy day at KSC. Shuttle workers plan to begin replacing a large, 90-pound shuttle main engine valve after it failed during a tanking test Wednesday, and continue external tank inspections. About 5 p.m., the four astronauts flying the final mission are scheduled to arrive for training, including Thursday's countdown dress rehearsal. Web posted. (2011). [Pride, sadness tug at Atlantis payload teams [Online]. Available WWW: http://www.floridatoday.com/ [2011 June 18].]

**June 20: Atlantis crew plans to 'savor the moment'**

The four astronauts preparing to fly the final shuttle mission are soaking in every detail about the experience before it's over. "We're just trying to savor the moment," mission commander Chris Ferguson said after the crew arrived at the space center Monday afternoon for several days of training. "As our children and our children's children ask us, we want to be able to say, 'We remember when there was a space shuttle.' " Joining Ferguson at the shuttle runway were pilot Doug Hurley and mission specialists Sandy Magnus and Rex Walheim, all veterans of at least one shuttle flight. The crew plans to launch with Shuttle Atlantis at 11:26 a.m. July 8 on a 12-day mission to resupply the International Space Station. Shuttle program managers were scheduled to meet today to review the flight's readiness. A follow-up meeting planned next Tuesday will set an official launch date. The astronauts' standard pre-launch training includes reviews of procedures for escaping the pad during an emergency, fit checks of their orange launch-and-entry suits and practice landings. On Thursday, the crew will suit up, ride to the launch pad and strap into seats aboard Atlantis for the last dress rehearsal of a shuttle launch. "We're incredibly proud to represent this, the final flight," Ferguson said. Web posted. (2011). [Atlantis crew plans to 'savor the moment' [Online]. Available WWW: http://www.floridatoday.com/ [2011 June 20].]

**June 22: Shuttle Atlantis crew takes armored tank for a spin**

Space shuttle Atlantis' astronauts Tuesday took turns test-driving an armored tank around Complex 39 as part of their emergency training exercises. The tank would be used by the crew to escape the pad 39A bunker in a dire scenario during the countdown. Space shuttle Atlantis' astronauts Tuesday took turns test-driving an armored tank around Complex 39 as part of their emergency training exercises in the Terminal Countdown Demonstration Test. The tank would be used by the crew to escape the pad 39A bunker in a dire scenario during the space shuttle countdown. Wednesday's opportunity to familiarize themselves with the vehicle occurred in the fields adjacent to the launch site. Web posted. (2011). [Shuttle Atlantis crew takes armored tank for a spin [Online]. Available WWW: http://www.spaceflightnow.com/ [2011 June 22].]

**Online prices soar for space shuttle Atlantis launch tickets**

John Milleker was so disheartened when he saw the prices listed on eBay for tickets to the last shuttle launch that he nixed traveling to Florida to watch the final liftoff. Packages of tickets are being offered for hundreds of dollars -- and as high as $5,000 -- on certain Web sites. That dwarfs the $20 to $65 price charged at Kennedy Space Center Visitor Complex. While a shuttle launch can be seen for free at beaches and other spots around Brevard, tickets for a closer view have been in high demand for the final flights. At one point, trying to buy tickets from the Visitor Complex's website overwhelmed its servers -- and forced staffers to take a different approach. For the last four missions, tickets have been sold through a lottery system, spokeswoman Andrea Farmer said. Twice the number of people registered for the chance to buy tickets to the final launch of Atlantis on July 8, when compared to the previous launch, Farmer said. She declined to say how many registered or the number of tickets sold. Almost instantly, purchased tickets were listed on eBay and other sites. "It's out of our hands," said Farmer, adding that it's not against Florida law. Farmer warned anyone looking to buy tickets through a third party to make sure the package includes a vehicle placard, which is needed to pass security checkpoints. Web posted. (2011). [Online prices soar for space shuttle Atlantis launch tickets [Online]. Available WWW: http://www.floridatoday.com/ [2011 June 22].]

**NASA offers rare tour of museum-bound space shuttle Discovery**

As I shimmy feet-first through the round hatch opening, I know I'm crossing the same hallowed threshold as 186 astronauts who launched into space aboard shuttle Discovery. Squeezing by a ladder to an upper level, I climb into a small, dimly lit room a little taller than I am and noisy with the sound of air blowing through a large overhead tube. It takes a moment to realize I'm in Discovery's middeck, where up to three astronauts sit for launch and landing. It's hard to imagine this is the biggest interior space some crews had to roam during entire missions. "That's everybody's initial reaction," says Charlie Bell, a United Space Alliance technician. "But compared to a capsule, this is quite large, actually." Journalists on Tuesday got

a rare chance to enter an orbiter's crew module as the shuttle program nears its 135th and final flight next month. Inside one of two shuttle hangars still in use at Kennedy Space Center, NASA and USA escorts showed off Discovery midway through its preparation for a planned April ferry flight to the Smithsonian Institution in Washington, D.C. As at the launch pad, a white hallway leads to the orbiter hatch. Signatures from employees and VIPs cover the walls. It's humbling to see the signatures of Mercury Seven astronaut Wally Schirra, Apollo moonwalker Gene Cernan and shuttle Columbia's lost crew. Someone recently wrote over the faded signature of former British Prime Minister Margaret Thatcher. Teams working in Discovery used to wear a full anti-contamination suit -- called a "bunny suit" -- to maintain its pristine condition between flights. Now, only a pair of red-soled, non-skid booties is required. "It's weird," says Jennifer Nufer, NASA's vehicle manager for the last six of Discovery's 39 flights, who's still adjusting to the relaxed standards. The middeck is much roomier than it would be for flight, empty of the three crew seats and walls of lockers that would be packed with cargo. Crawling aft through a short tunnel, I reach the airlock where astronauts would enter the International Space Station, or where spacewalkers would float outside. Suddenly, I'm poking my head out into what seems a vast expanse of the shuttle's 60-foot payload bay, sloping up on either side like a half-pipe for skateboarders. I imagine seeing the Hubble Space Telescope before it was deployed by a Discovery crew in 1990, or the giant cylindrical cargo module recently installed in Atlantis at launch pad 39A. Retreating to the middeck, I climb the ladder's seven steps to the more cramped flight deck; its covered windows give it a cave-like feel. There's barely enough room to kneel behind the commander and pilot seats, which look uncomfortable with minimal cushioning. Switches, dials and digital displays cover every surface, some shielded to make sure they're not hit by accident. It's just another day at the office for 27-year USA technician and "spacecraft operator" Bill Powers. He'll be at the controls inside Atlantis when it's towed off the runway to end the shuttle program. "We've still got a job to do, and so there's a lot to pay attention to," he said. "It'll be bittersweet later." Web posted. (2011). [NASA offers rare tour of museum-bound space shuttle Discovery [Online]. Available WWW: http://www.floridatoday.com/ [2011 June 22].]

**Shuttle tank inspections going well, valve replaced**

Engineers carrying out X-ray inspections of 50 rib-like "stringers" in the shuttle Atlantis' external tank are running ahead of schedule and so far, officials said Wednesday, there are no signs of any temperature-induced cracks in the wake of a fueling test last week. Working in parallel, another team replaced a leaking hydrogen valve in main engine No. 3 on Tuesday. Reassembly and closeout should be complete by this weekend, clearing the way for tests to make sure the valve is leak free and working properly for launch July 8. Atlantis crew, meanwhile -- commander Christopher Ferguson, pilot Douglas Hurley, flight engineer Rex Walheim and cargo loadmaster Sandra Magnus -- is at the Kennedy Space Center this week to review launch pad emergency procedures and to participate in a dress-rehearsal countdown Thursday, a major milestone on the road to launch. The astronauts have participated in fire training, inspected the launch pad's emergency slidewire escape system, inspected a safety bunker and practiced driving an armored personnel carrier stationed near the pad for an emergency evacuation. The primary goal of the 135th and final shuttle mission is to deliver cargo and supplies to the International Space Station to support a six-person crew through 2012 as hedge against problems that might delay commercial unmanned cargo ships being built to replace lost shuttle capability. Atlantis also will deliver experimental robotic satellite refueling gear and bring back to Earth an ammonia coolant system pump that failed last year. NASA managers plan to meet at the Kennedy Space Center next Tuesday to review Atlantis' ground processing and to set an official launch date. As of this writing, the shuttle appears on track for liftoff at 11:26:46 a.m. EDT (GMT-4) on July 8. NASA will be able to make two launch attempts in three days before standing down for the launch of an unmanned Delta 4 rocket July 14. The next shuttle launch window opens July 16 and extends through the end of the month. An on-time launch assumes the fuel valve replacement and retest go smoothly and that no problems are found with the stringers making up the external tank's central compartment. The ribbed intertank section separates the tank's liquid hydrogen and oxygen tanks, with the upper dome of the hydrogen tank fitting into the bottom of the intertank and the lower dome of the oxygen tank fitting in the top. During an attempt to launch the shuttle Discovery on its

final flight last year, engineers discovered stress-relief cracks in several of the stringers making up the intertank. After an exhaustive investigation, NASA determined that the lightweight aluminum-lithium alloy used to make the stringers in question came from a lot that was more susceptible to fractures than normal. When the tank was loaded with propellants, and the contraction of the oxygen tank pulled the tops of the intertank stringers inward, cracks developed. NASA installed structural stiffeners called radius block doublers on the top few inches of the stringers to add additional strength, preventing cracks that might compromise the tank's structural integrity or cause foam insulation to pop off during ascent. Discovery's tank performed normally during the shuttle's eventual launch last February. Because the stringers in Atlantis' tank had a similar pedigree, NASA managers ordered installation of radius block doublers and ordered a fueling test last week to subject the system to cryogenic conditions. Engineers began X-ray inspections of the stringers facing Atlantis on Monday and by Wednesday, the upper sections of the 50 stringers on the side of the tank facing Atlantis had been inspected. "So far, they've seen nothing amiss," said a NASA spokesman. Web posted. (2011). [Shuttle tank inspections going well, valve replaced [Online]. Available WWW: http://www.spaceflightnow.com/ [2011 June 22].]

**June 23: Taurus II Engine Sustained Damage In Fire**

An Aerojet AJ26 engine destined to power the Orbital Sciences Corp. Taurus II launch vehicle in the run-up to commercial resupply flights for the International Space Station (ISS) was badly damaged in a fuel fire June 9. "There was significant damage to the engine," Orbital spokesman Baron Beneski said June 21. NASA is counting on the Taurus II/Cygnus and the Space Exploration Technologies (SpaceX) Falcon 9/Dragon combinations to help resupply the station when the space shuttle fleet retires after the upcoming final flight of shuttle Atlantis. Beneski and Glenn Mahone, a spokesman for Aerojet, say the AJ26 engine shut down prematurely after a fuel leak developed during a hot-fire acceptance test, and the leaking kerosene fuel ignited. While the engine was damaged, the test stand at Stennis Space Center suffered only minor damage, the spokesmen said in separate telephone interviews. Mahone says a team of rocket engine experts from Aerojet, Orbital and NASA is investigating the cause of the mishap and the extent of the damage to the engine. The results of the investigation and prognosis for the engine and the Taurus II should come together by the end of this week or early next week, Beneski says. Two other AJ26 engines have completed hot-fire acceptance testing without mishap, according to the Aerojet website. Beneski said the engine mishap potentially affects the testing planned to get the Taurus II ready for operational missions to resupply the ISS. The new Taurus II pad at Wallops Island, Va., should be completed in two weeks, he says, and ready for a NASA certification process that will take six to eight weeks. Web posted. (2011). [Taurus II Engine Sustained Damage In Fire [Online]. Available WWW: http://www.aviationweek.com/ [2011 June 23].]

**STS-135: Atlantis completes TCDT – External Tank death camera ready**

With her team ably dealing with the usual pad flow hiccups, Atlantis is heading towards her July 8 launch date with no major issues, with the Terminal Countdown Demonstration Test (TCDT) completed on Thursday. While inspections continue on the numerous stringers on Atlantis' External Tank (ET-138), work on the camera modification – designed to film the tank's destructive re-entry – has been completed. The TCDT – otherwise known as S0017 operations – is a full scale dress rehearsal for the big day, allowing the STS-135 crew to conduct Emergency Egress Training, along with suiting up and ingressing Atlantis for a simulated countdown. The operations began at 7:30am local time on Wednesday, ending with a simulated countdown to T-0, marked at 11am local on Thursday. Atlantis' engineers also met with the crew at the TCDT L-1 meeting on Wednesday, briefing the astronauts on the health of their orbiter. The meeting discussed the brake fire from Endeavour's landing on STS-134 – of which there are no real concerns. The engineering teams also presented Commander Chris Ferguson and his crew with a large cardboard key to the orbiter with all the systems engineers' signatures on it. Meanwhile, teams are continuing to secure Atlantis' payload, known as S0600 Vertical Payload Operations. This included work on the Orbiter Boom Sensor System (OBSS), which was observed to have an issue with a camera on Sensor Package 1. Technicians are also carrying out methodical inspections of ET-138's flanges,

scanning the Thermal Protection System (TPS) foam for signs of cracks in the underlying stringers. Work had also begun to re-activate Diego Garcia (REEF) ground station, while Navy ship-based assets are still being investigated. Aircraft options, such as the P3 Orion, were classed as unavailable. With the aforementioned work in place, and the camera transmitting through until the tank's destruction, the opportunity to gain first-of-its-kind imagery of a tank's death plunge is now on the cards. However, it is questionable as to the quality of the footage. Another problem will be the tank's tumble, given there is no attitude control for the tank during entry. The FRR presentation also listed the expected problems with the footage, adding that technicians will attempt to record the video feed, as opposed to feeding it live to NASA TV, etc. Web posted. (2011). [STS-135: Atlantis completes TCDT – External Tank death camera ready [Online]. Available WWW: http://www.nasaspaceflight.com/ [2011 June 23].]

**Rocket carrying 17 education experiments is launched from Virginia**

A rocket carrying 17 educational experiments has been launched from Virginia's Eastern Shore. NASA says the Terrier-Improved Orion suborbital rocket was launched at 6:17 a.m. Thursday from its Wallops Island Flight Facility. The experiments were built by university instructors and students from across the country. A U.S. Air Force rocket carrying a Defense Department satellite is scheduled to be launched from the Wallops Island facility on June 28. Web posted. (2011). [Rocket carrying 17 education experiments is launched from Virginia's Eastern Shore [Online]. Available WWW: http://www.orlandosentinel.com/ [2011 June 23].]

**Final shuttle astronauts practice their countdown**

The Atlantis astronauts followed a realistic countdown sequence today, getting suited up and strapping inside the space shuttle for a thorough dress rehearsal that culminated with a pretend ignition and shutdown of the three main engines at T-minus 4 seconds. Commander Chris Ferguson, pilot Doug Hurley and mission specialists Sandy Magnus and Rex Walheim got dressed in their bright orange spacesuits and emerged from crew quarters at 7:45 a.m. The Astrovan delivered the astronauts to the seaside pad to begin entering the orbiter and taking their assigned seats for the "dry" countdown, which did not involve fueling the shuttle. The final count also practiced holds at the intermediate way points of T-minus 5 minutes and T-minus 1 minute, 57 seconds before eventually ticking down to the simulated pad abort at 11:05 a.m. EDT. The Terminal Countdown Demonstration Test concluded with the astronauts exiting the shuttle at 11:25 p.m. to rehearse the "Mode 1" emergency evacuation procedures and hopping in the escape baskets hanging on the launch tower. Every shuttle crew undergoes the TCDT before a planned launch. While in Florida, the astronauts spent time learning about emergency equipment, test-drove an armored tank for evacuating the pad, got some landing practice in the training aircraft and toured the payload bay. The astronauts will return to Kennedy Space Center on July 4 to begin their true countdown activities to launch. Liftoff remains targeted for July 8 at 11:26 a.m. EDT on a two-week flight to deliver a final shuttle-delivered load of supplies, spare part and science equipment to the International Space Station. Web posted. (2011). [Final shuttle astronauts practice their countdown [Online]. Available WWW: http://www.spaceflightnow.com/ [2011 June 23].]

**US Senate threatens NASA with subpoena**

Unless NASA hands over the documents it wants by June 27, the U.S. Senate committee with NASA oversight warned that it would subpoena the agency for drafts and other documents on how NASA plans to replace the space shuttle, according to a letter dated Wednesday and made public today. "... you have thwarted our oversight activities by withholding key documents that describe NASA's compliance with the 2010 [NASA Authorization] Act," wrote the Senate Commerce, Science and Transportation committee, alluding to a law that requires NASA to build a replacement to the shuttle built largely from shuttle pieces and remnants from the defunct Constellation moon program. "For example, NASA informed Commerce Committee staff during a telephone call on June 7, 2011, that NASA was withholding at least 19 separate drafts of a report ... [that] may contain important information about the data and analyses NASA has relied on to comply with the 2010 Act's space launch system and crew

vehicle requirements," noted the letter, which was signed by Chairman John Rockefeller, D-West Virginia, and Sen. Kay Bailey Hutchison of Texas, the top Republican on the committee. U.S. Sen. Bill Nelson, D-Florida, also serves on that committee and has been a champion of the 2010 NASA law. NASA has struggled for months to come up with a design after telling Congress in January that it did not have the time or resources to build a vehicle that could reach the International Space Station by 2017 — a deadline mandated in the NASA authorization act. The agency has since settled on a design — although the decision is not public yet. Web posted. (2011). [US Senate threatens NASA with subpoena [Online]. Available WWW: http://www.orlandosentinel.com/ *the write stuff blog* [2011 June 23].]

**New Mars rover preparing for launch at KSC**

With its launch still at least five months away, NASA's Curiosity rover, the biggest and most advanced built to explore Mars, completed its journey from California to Kennedy Space Center this week. An Air Force C-17 transport plane on Wednesday delivered the rover and the descent stage that will help lower it to the Martian surface. A cruise stage and aeroshell that will protect the vehicle during its descent were already here at KSC. NASA is targeting a blastoff of the $2.5 billion Mars Science Laboratory mission between Nov. 25 and Dec. 18 atop an Atlas V rocket from Cape Canaveral Air Force Station. The launch would put the car-size rover and its 10 instruments on track to land on Mars in August 2012, beginning at least a two-year science mission intended to determine whether Mars ever had environmental conditions favorable for supporting microbial life. Missing the upcoming window would mean a delay of another 26 months due to planetary alignments, and an increase in mission costs of at least $570 million, the report said. The mission is already two years behind after missing its original window in 2009 due to technical issues. NASA officials said they are confident they'll be ready to launch Curiosity later this year without scaling back its mission. Web posted. (2011). [New Mars rover preparing for launch at KSC [Online]. Available WWW: http://www.floridatoday.com/ [2011 June 24].]

**June 24: NASA Will Host 150 People For Tweetup**

NASA will host a two-day launch Tweetup for 150 of its Twitter followers on Aug. 4 - 5 at the agency's Kennedy Space Center in Florida. The Tweetup is expected to culminate in the launch of the Jupiter-bound Juno spacecraft aboard an Atlas V rocket. The launch window opens at 11:39 a.m. EDT on Aug. 5. The spacecraft is expected to arrive at Jupiter in 2016. The mission will investigate the gas giant's origins, structure, atmosphere and magnetosphere. Juno's color camera will provide close-up images of Jupiter, including the first detailed glimpse of the planet's poles. The Tweetup will provide @NASA Twitter followers with the opportunity to tour the Kennedy Space Center Visitor Complex; speak with scientists and engineers from the Juno and other upcoming missions; and, if all goes as scheduled, view the spacecraft launch. The event also will provide participants the opportunity to meet fellow tweeps and members of NASA's social media team. Juno is the second of four space missions launching this year, making 2011 one of the busiest ever in planetary exploration. Aquarius was launched June 10 to study ocean salinity; Grail will launch Sept. 8 to study the moon's gravity field; and the Mars Science Laboratory/Curiosity rover heads to the Red Planet no earlier than Nov. 25. ["NASA Will Host 150 People For Tweetup At Launch Of Jupiter-Bound Mission," **NASA Media Advisory #M11-131**, June 24, 2011.]

**KSC teams completing Atlantis engine repair**

Kennedy Space Center teams over the weekend will wrap up repair work on an Atlantis engine ahead of a Tuesday flight readiness review that will set an official launch date for the 135th and final shuttle mission. The launch is tentatively planned for 11:26 a.m. July 8. Technicians this week replaced the main fuel valve on shuttle main engine No. 3 after a suspected liquid hydrogen leak during a tanking test June 15. Leak tests will be performed this weekend. Teams will also complete X-ray-like scans of about 50 support braces lining the midsection of the external tank, on the side facing the orbiter, to confirm none cracked during the tanking test. Some of the braces, called stringers, cracked when Discovery was fueled last fall. The stringer tops were reinforced on that tank and the last two to fly. The tops have been scanned with no word so far of any concerns. Scans of the stringer bottoms followed. Atlantis' four-

person crew flew back to Houston Thursday afternoon after completing a launch dress rehearsal. If a July 8 launch is confirmed, they'll plan to return to KSC on July 4 for the final launch. Atlantis is scheduled to fly a 12-day mission to resupply the International Space Station. Web posted. (2011). [KSC teams completing Atlantis engine repair [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 June 24].]

**Bracing for impact of shuttle program's end**

As the last shuttle flight approaches, engineers and technicians are considering leaving Brevard County to continue their careers. They will take their college degrees, their skills and their families with them, leaving the Space Coast with less of the talent pool that officials hoped would be a big draw for companies that can help rejuvenate the economy. Though its scope is fluid, this brain drain, as the exodus of skilled workers often is called, seems inevitable. With the next generation of spacecraft stalled in the design stage, any resurgence of aerospace jobs in Brevard will be delayed for several years. Thousands of aerospace workers face finding new careers locally or relocating as part of that quest. Hundreds already have made the move and hundreds more are expected to follow after another 2,000 space workers become unemployed July 22, after the final shuttle mission. This decrease of trained workers diminishes what Brevard leaders have touted as the county's best asset to attract new industry — an experienced and eager work force. But despite programs for retraining and incentives to encourage companies to hire, the departure of these people likely will continue until new industries take hold. Brevard's brain drain, statistics show, is likely to get worse. In May 2010, there were 197,800 jobs on the Space Coast. By May 2011, the number of jobs had fallen by 6,800 to 191,000, according to figures from the state Agency for Workforce Innovation. Despite the decrease in the number of jobs, the unemployment rate remained flat last month at 10.8 percent. That means, while some residents stopped looking for work, thousands of workers, including skilled workers, probably left the county and therefore no longer show up on the employment rolls. And the departures could continue as top-level jobs for aerospace workers continue to go away. The last major aerospace layoff on April 8 idled nearly 550 United Space Alliance workers. The unemployed included 51 computer specialists, 78 engineers and 163 aerospace technicians, positions that require years of education and/or experience. The July 22 layoff will involve engineers, technicians, computer programmers and office workers. Brevard's economic development officials are working to attract firms that bring high-tech jobs. There have been successes, including major aviation businesses that agreed to open at Melbourne International Airport, but the cultivation of jobs that utilize skills of aerospace workers is a lengthy — and uncertain — process. In the meantime, those workers need employment now and are forced to relocate, taking their spouses and families with them, which deprives the local economy even more. Web posted. (2011). [Bracing for impact of shuttle program's end [Online]. Available WWW: http://www.floridatoday.com/ [2011 June 24].]

**Shuttle workers prepare Discovery for museum duty**

Technicians preparing the shuttle Discovery for public display say the retired spaceship will be ready to leave the Kennedy Space Center in February for its new home at a Smithsonian museum annex near Washington. But the veteran spacecraft's piggyback journey atop a modified Boeing 747 carrier aircraft will likely not begin until April due to potential wintry weather along the East Coast, according to Stephanie Stilson, the NASA manager leading the shuttle retirement work at KSC. The specialized Shuttle Carrier Aircraft can only fly through fair weather with an orbiter riding piggyback. Discovery will take the place of shuttle Enterprise, a pathfinder vehicle used for atmospheric flight and landing tests in the 1970s. Enterprise is currently displayed in the Steven F. Udvar-Hazy Center of the Smithsonian National Air and Space Museum at the Washington Dulles International Airport in northern Virginia. Enterprise is heading for the Intrepid Sea, Air and Space Museum in New York City. Inside one of three space shuttle hangars at KSC, a team of engineers and technicians are preparing Discovery to leave the Florida spaceport for good. The work involves ridding the shuttle of toxic chemicals, removing avionics and wiring for inspections and putting the orbiter into the proper configuration for museum duty. The same team is busy working on shuttle Endeavour in the hangar next door. Endeavour returned from its

final flight June 1. When a shuttle returns from space, officials want to quickly drain propellant, fluids and remove its three main engines. Workers finished taking out Endeavour's engines this week, and the shuttle's nose steering jets were also scheduled to be removed this week, according to Stilson. The standard post-flight procedures are called "down-mission processing" in NASA-speak. Faced with cutbacks and layoffs amid the shuttle retirement, managers are overseeing a smaller team of technicians to do hands-on work with the vehicles. "We have a scaled-down team compared to when we're processing a flight vehicle," Stilson said. "That scaled-down team is focusing all their efforts on Endeavour's down-mission processing." After the initial post-flight work, each orbiter will go through months of safing and cosmetic preparations for display. Discovery's main engines, tail orbital maneuvering system pods and forward thruster system were removed this spring. The OMS pods and nose steering unit are now en route to White Sands, N.M., where engineers will pull out plumbing and tanks that contained hazardous propellant during the orbiter's service life. The shuttle's thrusters burn a mix of hydrazine and nitrogen tetroxide propellants. The fuel and oxidizer compounds are toxic to humans. "We don't want any hazardous materials in the vehicle in the museums, so we're gutting those components and taking all the piping out," said Kim Guodace, a shuttle vehicle engineer for United Space Alliance. Once the toxic systems are removed, NASA will ship the maneuvering units back to Florida to be installed in Discovery again. Engineers will place replica main engines on the back of the shuttle before it's moved to a museum. The agency plans to retain the shuttle's fleet of hydrogen-fueled engines for potential use on future rockets. Discovery's robot arm was also taken out of the payload bay for inspections. Each orbiter will go through a similar series of steps before they are handed over to museums. Endeavour will be displayed at the California Science Center in Los Angeles, while Atlantis will move to the Kennedy Space Center Visitor Complex. NASA is already decommissioning one of the space center's shuttle hangars, so managers are planning a juggling act to shift three vehicles among two processing facilities when Atlantis returns from the final shuttle mission in July. According to Stilson, Discovery will be rolled next month from its current location in Orbiter Processing Facility bay No. 2 to the mammoth Vehicle Assembly Building for storage. Atlantis will take Discovery's place in OPF 2 to start its standard post-flight safing procedures. This week, Stilson said teams are modifying part of Discovery's hydraulic system to deploy the shuttle's landing gear when it arrives at the Smithsonian display site near Washington, D.C. Although its last flight ended March 9, Discovery is still regularly powered up to monitor systems as engineers work on the ship. Discovery made 39 trips to space in its 27-year operational career, deploying and retrieving satellites, launching the Hubble Space Telescope and helping construct the International Space Station. Discovery's last power-up is scheduled for around October, then the orbiter will go dark for good. Web posted. (2011). [Shuttle workers prepare Discovery for museum duty [Online]. Available WWW: http://www.spaceflightnow.com/ [2011 June 24].]

**June 26: Orion capsule model arrives on the Space Coast**

A massive capsule which looks like the Orion Capsule is now on the Space Coast. NASA crews towed it on the back of a tractor trailer from Edwards Air Force Base in California. It is called a flight test article, 17 feet wide, and took up two lanes of traffic. It is looks like the Orion Capsule, but it's not designed to travel into space. NASA used it last May to test its effectiveness in the event of an emergency on the rocket if the astronauts had to escape. Crew members said it was interesting to see the capsule on busy highways. Wayne Hicks is the NASA Operations Engineer who was one of several people who transported the massive capsule. Hicks said, "Most of the time we were on two way back roads, so it was very interesting that the police that were traveling with us would stop traffic and pull them to the side of the road. We were going on a two way highway going 60 miles an hour, that was fun." They stopped at three museums in Tucson, Austin, and Tallahassee. Hicks said it attracted a lot of attention from people as they made their voyage across the country. He said NASA wants the public to see their next generation space craft, so they are placing it at the press site at the Kennedy Space Center the day of the launch of Atlantis-- July 8th. Until then it will be on display at the Kennedy Space Center Visitor Complex. Web posted. (2011). [Orion capsule model arrives on the Space Coast [Online]. Available WWW: http://www.cfnews13.com/ [2011 June 26].]

**NASA back-up plan: Russia to the rescue**

Four astronauts launching on NASA's final shuttle flight July 8 have booked a relatively short, 12-day round trip to the International Space Station. But if Atlantis is damaged so severely that it becomes unsafe for re-entry, the crew's visit could get a lot longer, with at least one of them unlikely to get home again until next May. "We don't have the luxury of having another shuttle that can come up and get us," Atlantis mission specialist Rex Walheim said. Since Columbia and seven astronauts were lost during atmospheric re-entry in 2003, when heat shield damage went undetected, NASA always has had a second shuttle ready for a rescue mission. But this time, there's no backup. Atlantis is outfitted with NASA's last shuttle external tank and solid rocket boosters. So NASA developed an alternate plan: The crew would stay on the station and make staggered returns on Russian Soyuz spacecraft. To accomplish that, NASA would forgo the launch of U.S. astronauts to the station to free up seats on the Russian ships. Then one or two at a time, the Atlantis astronauts would fly back on already scheduled Soyuz crew rotation missions. A Soyuz can carry three people. "It's a well thought out but lengthy process," Atlantis mission commander Chris Ferguson said. It's also highly unlikely it will have to be put to use. The exact odds: one in 560, according to a technical assessment done by the NASA Engineering and Safety Center, an independent organization formed after the Columbia accident to assess high-risk projects. Among its recommendations: limit the Atlantis crew to four people instead of the more typical six or seven. "With a crew of four, it takes a year to get everybody down, and that was deemed enough," Atlantis mission specialist Sandra Magnus said. With six or seven, "it would take close to two years to get everybody down," she said. Russia flies four Soyuz spacecraft to and from the station each year. Typically, two blast off between March and June, and two launch between September and December. Under NASA's original plan, Atlantis already would have been retired. The May 2010 Atlantis mission originally was going to be the orbiter's 32nd and final flight, but it was to be prepared for flight in case it was needed to serve as a rescue vehicle for Endeavour, which launched May 16 and landed June 1. But NASA and Congress decided last year to fly Atlantis on a final station supply run if no Endeavour rescue was required. The rescue-turned-logistics mission is viewed as a hedge against delays in the start-up of post-shuttle commercial cargo deliveries. Upon its return, Atlantis now is destined for display in retirement at NASA's Kennedy Space Center Visitor Complex. Web posted. (2011). [NASA back-up plan: Russia to the rescue [Online]. Available WWW: http://www.cfnews13.com/ [2011 June 26].]

**Transformers at Space Center**

Brevard - Science fiction meets hard-core science when "Transformers: Dark of the Moon" starts its summer-long showing at Kennedy Space Center's Visitor Complex. And it's a homecoming of sorts: Parts of the film were shot at KSC and the Cape Canaveral Air Force Station. A military fatigue costume worn by actor Josh Duhamel in the film will be on display at KSC's Sci-Fi Summer exhibit. Other tie-ins to the robot movie are expected to be announced in coming weeks. The 3D film will be shown at the space center's Imax theater starting Wednesday through Sept. 5. Web posted. (2011). [Transformers at Space Center [Online]. Available WWW: http://www.myfoxorlando.com/ [2011 June 26].]

**June 27: Tests Put Atlantis On Track for July 8 Launch**

NASA and contractor engineers successfully performed main engine tests on Atlantis over the weekend, putting the winged spaceship back on course for the planned July 8 launch of the nation's 135th and final shuttle mission. The frequency response test and the helium signature leak test both were performed to make certain a spare fuel valve on Atlantis' No. 3 engine will work properly during flight. The spare was installed to replace a valve that leaked during a June 15 external tank propellant-loading test. The so-called tanking test was performed to verify the integrity of structural braces on the ribbed center section of the shuttle's 15-story external tank. No cracks or other problems were detected during a weekend review of data from x-ray inspections of the metal alloy braces. The braces were manufactured with an alloy batch that proved susceptible to cracking. The engine tests cleared the way for technicians at Kennedy Space Center's launch pad 39A to start closing out the shuttle's aft compartment. Final ordnance

operations will get under way tonight as technicians rig up small explosive devices that will be used to separate the shuttle from its mobile launcher platform, solid rocket boosters and external tank in flight. Shuttle program managers will meet at KSC on Tuesday for the STS-135 Flight Readiness Review. The targeted July 8 launch date is expected to be firmed at the conclusion of that review. Web posted. (2011). [Tests Put Atlantis On Track for July 8 Launch [Online]. Available WWW: http://www.floridatoday.com/ [2011 June 27].]

**Next GPS satellite moves to Cape Canaveral launch pad**

A Global Positioning System satellite has been loaded aboard its ride to space, arriving Monday at Cape Canaveral's Complex 37 for mounting atop the United Launch Alliance Delta 4 rocket. Liftoff of the GPS 2F-2 spacecraft is scheduled for July 14 during a 19-minute window extending from 2:49 to 3:08 a.m. EDT (0649-0708 GMT). The launch is timed to deliver the satellite into the GPS constellation to replace a 20-year craft that has long exceeded its expected lifespan. GPS satellites fly about 11,000 miles above the planet and emit continuous navigation signals that allow users to find their precise position in latitude, longitude and altitude and determine time. Originally built for the U.S. military, the GPS service has spread across the world as an indispensable commercial utility. Launch base testing, the filling of maneuvering propellants and encapsulation within the two-piece rocket nose cone were among the activities accomplished at the satellite's cleanroom hangar. A motorized trailer then carried the 3,400-pound satellite up the road to Complex 37 early Monday. It was positioned on the oceanside of the mobile service gantry and hoisted into the pad tower for bolting to the rocket's second stage. Today's GPS constellation is comprised of 31 operational satellites, including 11 Block 2A's made by Boeing, 12 Block 2R's and seven 2R-Modernized spacecraft built by Lockheed Martin, and Boeing's first Block 2F. The craft takes over the position held by the GPS 2A-11 satellite, which was launched by a Delta 2 rocket from Cape Canaveral on July 3, 1991. Web posted. (2011). [Next GPS satellite moves to Cape Canaveral launch pad [Online]. Available WWW: http://www.spaceflightnow.com/ [2011 June 27].]

**NASA gives documents to Senate**

The deadline Monday passed without a threatened Senate subpoena being issued for NASA documents about development of its next heavy-lift rocket. "The agency is working to respond to the Senate commerce committee request and compiling the records requested," NASA spokesman J.D. Harrington said Monday. Democratic Sen. Jay Rockefeller of West Virginia, chairman of the Senate science committee, and the committee's top Republican, Kay Bailey Hutchison of Texas, threatened on Wednesday to subpoena documents they want about the rocket if NASA didn't provide them by 6 p.m. Monday. Development of a heavy-lift rocket was key to a congressional compromise in October supporting both that program and development of commercial rockets to ferry people to the International Space Station in place of the canceled return-to-the-moon Constellation program. But lawmakers have been disappointed in the amount of documents that NASA has provided about how it will pursue the heavy-lift rocket, which is competing for budget dollars with commercial rockets. And there have been concerns that NASA isn't adequately pursuing this policy goal. NASA Administrator Charles Bolden wrote lawmakers Thursday that the agency had provided hundreds of pages of contract documents and that agency staffers are in regular contact with committee staffers. Senators and their staffers are reviewing the documents NASA has provided and no subpoena was issued Monday. Web posted. (2011). [NASA gives documents to Senate [Online]. Available WWW: http://www.floridatoday.com/ [2011 June 27].]

**End of the Shuttle Era: Q&A With Shuttle Launch Director Mike Leinbach**

He has been with the shuttle program for the past three decades and has witnessed both its tragedies and its triumphs. NASA's Shuttle Launch Director Mike Leinbach reflected on the end of the shuttle era when interviewed this week. He talked a bit about his plans for the future as well as what he thinks people can expect from both him and his team on launch day. Q: The Terminal Countdown Demonstration Test (TCDT) for STS-135 has just wrapped up, is this is a period of accelerated work for you and your team or

is this a time when you can catch your breath? Leinbach: "This TCDT was a little different; we had a very busy period getting the crew ready for this mission. On July 4 we'll have a bit of a break and then things will pick right back up again as we get ready for launch." Q: What do you think you will be feeling when that final launch occurs? Leinbach: "I don't know, I mean I have thought a lot about this…I don't know what it's going to be like. For the last flight of Discovery we had one more launch for both Endeavour and Atlantis, well now this really and truly the last flight of the shuttle program… so it's going to be a very reflective time." Q: Do you think anything will be special about this mission? Leinbach: "The launch itself will be very much any other launch. When the guys are working on the consoles they are very serious about what they are doing. They won't be distracted by the fact that it is the last one. Q: Speaking of your job – it keeps you very busy, have you had any time to reflect? Leinbach: "For the moment I still have a lot to do concluding TCDT, but this Saturday I am planning on driving out to the launch pad and just looking up at Atlantis and just soaking it all in, all by myself." Leinbach started working for NASA as a structural engineer in 1984, his words are softly spoken which tends to lend them even more weight. His first mission as launch director was STS-114. This was the first shuttle launch after the loss of the space shuttle Columbia in 2003. Leinbach led the recovery team searching for Columbia's debris in Texas. A year later in 2004 Leinbach was awarded the Presidential Rank Award, which is given in recognition of long-term accomplishments. Atlantis will carry the four person crew of STS-135 to the International Space Station on a resupply flight designed to keep the orbiting outpost well stoked after the shuttles are decommissioned. The mission is scheduled to last twelve days, launching on July 8 at 11:26 a.m. EDT. The crew consists of Commander Chris Ferguson, Pilot Doug Hurley and Mission Specialists Sandra Magnus and Rex Walheim. The Launch Control Center or LCC is where the final "go" "no-go" for launch is determined. Web posted. (2011). [End of the Shuttle Era: Q & A With Shuttle Launch Director Mike Leinbach [Online]. Available WWW: http://www.universetoday.com/ [2011 June 27].]

**Atlantis in good shape**

The July 8 target launch date for the nation's final shuttle mission likely will be firmed up today after a formal readiness review at Kennedy Space Center. Four astronauts are tentatively scheduled to blast off at 11:26 a.m., July 8 on a final shuttle supply run to the International Space Station. Weekend engine tests and a review of data from X-ray inspections of the shuttle's external tank put NASA back on course for launch a week from this coming Friday. Senior NASA executives and managers are expected to confirm the launch date and time at the conclusion of today's agency-level flight readiness review. "We're still looking good for the July 8 target date," KSC spokesman Allard Beutel said. "We still have several days of cushion in the schedule." During the weekend, NASA performed a valve-cycling test as well as a leak test to make certain a spare fuel valve in the No. 3 engine of Atlantis is working properly. The spare replaced a valve that leaked during a June 15 external tank propellant-loading test. The tanking test was performed to verify the integrity of metal braces on the ribbed center section of the shuttle's 15-story external tank. No defects were detected during a weekend review of data from X-ray inspections of the braces. The braces came from a manufacturing lot that proved susceptible to cracking. Discovery's 39th and final flight was delayed four months so that cracked braces from the same lot could be repaired. The same repairs were made on the Atlantis tank. The Atlantis crew is scheduled to arrive at NASA's shuttle homeport next Monday --the July 4 holiday. The crew includes commander Chris Ferguson, pilot Doug Hurley and mission specialists Sandra Magnus and Rex Walheim. NASA's final shuttle launch countdown is slated to pick up at 1 p.m. next Tuesday. Atlantis is scheduled to touch down on KSC's shuttle runway at 7:06 a.m. on July 20 -- the 42nd anniversary of the historic Apollo 11 moon landing. Web posted. (2011). [Atlantis in good shape [Online]. Available WWW: http://www.floridatoday.com/ [2011 June 27].]

**June 28: STS-135: FRR sets July 8 Launch Date for Atlantis**

The Agency Flight Readiness Review (FRR) has – as expected – approved the July 8 launch date, after all outstanding issues were confirmed to be out of Atlantis' path for what will be the final Space Shuttle mission. Meanwhile, the International Space Station (ISS) crew were put through a contingency event on

Tuesday, following a late conjunction which missed the orbital outpost. Atlantis will carry the Multi-Purpose Logistics Module (MPLM) Raffaello and a Lightweight Multi-Purpose Carrier (LMC) to the International Space Station for a 12 days baseline mission, as much as Station managers have requested an additional docked day in the timeline. Such a decision will be taken during the mission, based on the crew's workload, progress on the timeline and Atlantis' consumables status, given she is slightly handicapped – when compared to her two sisters – due to the lack of a Station-to-Shuttle Power Transfer System (SSPTS). With the Agency FRR approval, engineers out at Pad 39A will continue with their preparations for the S0007 Launch Countdown, with final replenishment of the LH2 and LOX spheres at the pad complex in work, in tandem with closeouts on the orbiter, final ordnance installation and preps for the pressurization of Atlantis' Main Propulsion System (MPS). Web posted. (2011). [STS-135: FRR sets July 8 Launch Date for Atlantis – Debris misses ISS [Online]. Available WWW: http://www.nasaspaceflight.com/ [2011 June 28].]

**Minotaur Rocket Launch from NASA Wallops Re-scheduled for 29 June**

NASA's Wallops Flight Facility in Virginia has rescheduled the launch of an United States Air Force Minotaur 1 rocket carrying the ORS-1 satellite for the Department of Defense's Operationally Responsive Space Office. Originally set for June 28, the new launch date is June 29. The launch on June 28 was postponed due to thunderstorms in the area. The Minotaur 1 will be launched between 8:28 and 11:28 p.m. The backup launch days are June 30 through July 10. Web posted. (2011). [Minotaur Rocket Launch from NASA Wallops Re-scheduled for 29 June [Online]. Available WWW: http://www.spaceref.com/ [2011 June 28].]

**June 29: Photographer captures Kennedy Space Center**

Vincent Fournier's photography captures a longing for the space age that lives somewhere between the recently made-possible and the science fiction of the 70s and 80s. Inspired by trips to the Paris museum of science, Vincent has been fascinated by the machine world since his youth and incorporates it into most of his work. In his "Space Project," Vincent pays homage to the world's great centers of space exploration and study: Gagarin Cosmonaut Training Center in Russia, Mars Desert Research Station in Utah, various observatories and antenna arrays, and, most recently, the Ariane Space Center in French Guiana. Just this past month, Vincent finally got permission to shoot in NASA's Kennedy Space Center in Florida, home of the soon-to-be-closed space shuttle program, and Vincent's holy grail. Vincent (with us tailing him) was graciously afforded an almost all-access behind the scenes tour of Kennedy Space Center -- mission control was a no-go, unsurprisingly -- which included a pilgrimage to launchpad 39A, site of the impending STS-135 mission, NASA's last in the Space Transportation System (STS, or Space Shuttle) era. He also got a peek at the NASA engine shop, shuttle landing facility and control tower, vehicle assembly building, and mobile launch platforms, as well as several other difficult-to-remember locales. Throughout our visit, Vincent kept asking the kind NASA public affairs officers if there were "clean rooms" or "white rooms" he could photograph in, and they were generous enough to let him navigate his way through a handful. At one point, we entered an enormous three-chambered room full of men and women working on towering rocket engines. It was akin to stumbling on to the set of Micro Machines: the Movie but with the people in miniature. Vincent snapped a few photos but pressed forward quickly, as he was more interested in the adjacent airlock room with its almost fully white aesthetic. Here he had a little more freedom to let his cinematic imagination take hold, as well as the option of positioning a worker in a clean room suit (aka "bunny suit"). While the trip represented a longtime goal for Vincent, there was an overwhelming sense of nostalgia to almost everything we saw. It was bittersweet to visit NASA while workers were getting their layoff notices and the shuttle program, with all its attendant promise and tragedy, was in its final days. Viewing the Atlantis orbiter perched on the launch pad and protected by the service structure made it seem very fragile, even though it was made to travel over 100 times the speed of sound. To see photos from Fournier's shoot at Kennedy Space Center, visit Motherboard.tv Web posted. (2011). [Photographer captures Kennedy Space Center in waning moments of shuttle program [Online]. Available WWW: http://www.cnn.com/ [2011 June 29].]

**June 30:** **Final Shuttle Crew On Hand For Atlantis Rollout**

Shuttle Atlantis is poised in the Kennedy Space Center Vehicle Assembly for its scheduled rollout to the launch pad tonight for NASA's final shuttle flight. With the shuttle stacked atop a mobile launcher platform, a giant crawler-transporter originally built for the Apollo moon-landing project will creep out of the 52-story assembly building at 8 p.m. The four astronauts who will fly the STS-135 mission will be on hand for the rollout. Mission commander Chris Ferguson, pilot Doug Hurley and mission specialists Sandy Magnus and Rex Walheim will field questions at the Launch Complex 39 Press Site while a flood-lit Atlantis moves toward the launch pad in the background. Some 8,000 employees and guests are expected to attend the last shuttle rollout. The weather forecast looks good and NASA is working no technical show-stoppers at this point. Web posted. (2011). [Final Shuttle Crew On Hand For Atlantis Rollout [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011 June 29].]

**Tactical spy satellite streaks into space on Minotaur rocket**

A Minotaur rocket roared into orbit from the Virginia coast Wednesday night, successfully deploying a small spacecraft to make the benefits of satellite technology more accessible to deployed U.S. military forces in Afghanistan and other war zones in the Middle East. The 957-pound spacecraft blasted off at 11:09 p.m. EDT Wednesday (0309 GMT Thursday) atop a Minotaur 1 rocket from the Mid-Atlantic Regional Spaceport at Wallops Island, Va. The seven-story booster, powered by decommissioned Minuteman missile stages, streaked into a clear sky and surpassed the speed of sound in the first half-minute of flight. The launch was visible up and down the East Coast from North Carolina to New York. Web posted. (2011). [Tactical spy satellite streaks into space on Minotaur rocket [Online]. Available WWW: http://www.spaceflightnow.com/ [2011 June 30].]

## JULY

**July 1: Atlantis one week from final shuttle launch**

Four Atlantis astronauts will enter quarantine in Houston today after a final ascent simulation, one week before their planned blastoff from Kennedy Space Center at 11:26 a.m. next Friday to begin the 135th and last shuttle mission. "It sounds so final," mission commander Chris Ferguson said during press briefings Thursday. "I don't think we want any more time, though. We're ready. We're trained. We want to go do it and we want to go do it on time." At launch pad 39A today, technicians are working to close out the aft compartment of shuttle Atlantis. Earlier this week, teams pressurized the orbiter's propulsion systems and closed its payload bay doors for flight. Inside the cargo bay is a module packed with 8,600 pounds of supplies and spare parts that will help keep the International Space Station fully stocked and staffed through 2012. Mission commander Chris Ferguson, pilot Doug Hurley and mission specialists Sandy Magnus and Rex Walheim plan to fly into KSC around 2:45 p.m. on Independence Day, and the final shuttle countdown will pick up at 1 p.m. Tuesday. After a series of media events in recent days and weeks, Ferguson said Thursday he was looking forward to quarantine for some quiet time to review notes and collect his thoughts before the final shuttle launch. Only medically approved personnel staff and family can interact with the crew members during quarantine. They'll start out in Building 259 at Johnson Space Center and move into crew quarters in the Operations and Checkout building when they arrive at Kennedy. KSC processing teams are scheduled to have the July 4 holiday weekend off, barring any severe weather that requires inspections of Atlantis at the pad. Web posted. (2011). [Atlantis one week from final shuttle launch [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, July 1].]

**Shuttle crew focused on final mission with fewer hands**

The last astronauts to fly on the space shuttle aren't too worried about their place in history. They're worried about their workload. Shuttle Atlantis is scheduled to blast off July 8 on a 12-day mission to the International Space Station that will also be the final mission of the space shuttle era. In a throwback to the beginning of the shuttle's career, Atlantis will have a crew of only four, rather than the now-standard six or seven. The result is an intense workload that will tax the last shuttle astronauts — all experienced space hands — to their limits. The small crew is a safety precaution. In the past, another shuttle stood ready to fetch any crews that got stranded in space. Now NASA has no intact shuttle left to serve as rescue vehicles. Shuttles Endeavour and Discovery are already being dismantled in preparation for their next role as museum exhibits. If Atlantis can't make it home safely, the astronauts will wait at the space station, already home to six people, to be picked up by Russian spaceships. A smaller Atlantis crew ensures the astronauts wouldn't run out of food or other supplies while they wait to be evacuated to Earth, a gradual process that could take almost a year. Although the shuttle won't carry a full crew, the astronauts have a long list of chores. They'll have some 10,000 pounds of supplies to bundle from Atlantis on to the station and a similar amount to tote from the station onto the shuttle. To help them cope, shuttle officials have asked Mission Control to take over some tasks, such as pointing cameras while the station's robotic arm is being used, that are normally performed by astronauts in space. After Atlantis returns to Earth, NASA will have no spaceship to send astronauts to orbit. Instead, NASA hopes to farm out that job to private companies. In the meantime, astronauts will continue to live on the space station, traveling there on Russian rockets, while NASA works on a rocket big enough to carry crews to the moon and beyond. Web posted. (2011). [Shuttle crew focused on final mission with fewer hands [Online]. Available WWW: http://www.usatoday.com/ [2011, July 1].]

**Inspector general: NASA faces 'multiple challenges and risks'**

NASA must protect against cost increases in developing commercial rockets while providing a reliable — and safe — way for people to reach the International Space Station post-shuttle, the agency's inspector general warned this week. Demand for commercial rockets will increase after Atlantis' planned July 8

launch, the last of the shuttle program. NASA has contracted for seats aboard Russian Soyuz rockets to ferry people to the space station until at least June 2016. The hope is that commercial space taxis will be flying in 2015. Inspector General Paul Martin warned that "NASA faces multiple challenges and risks" as it becomes a full-fledged transportation program. Concerns include: *Verifying that private rocket companies have met the agency's health, engineering and safety requirements to carry people. *Finalizing a strategy for funding rocket development, expected this summer, so costs don't rise prohibitively. President Barack Obama and Congress have agreed to support development of commercial rockets as the most cost-effective way to reach the space station, while also backing NASA's development of a heavy-lift rocket capable of reaching Mars. But the debate over spending priorities remains contentious. Obama wants to spend more developing commercial rockets than Congress wants to spend, and key lawmakers want to spend more on a heavy-lift rocket than Obama would like. NASA awarded $50 million in 2009 to encourage commercial development. In April, the agency announced another $269.3 million for such projects. The agency announced Wednesday that its industry partners have met their initial goals in what is called Commercial Crew Development 2 or CCDev2. Web posted. (2011). [Inspector general: NASA faces 'multiple challenges and risks' [Online]. Available WWW: http://www.floridatoday.com/ [2011, July 1].]

**July 2: Final NASA shuttle mission clouded by rancor**

The last shuttle, Atlantis, sits on Pad 39A, ready for its valedictory flight. It is the nature of a shuttle to look kind of lonely out there on the pad, kept at a safe remove from the control room, the hangars, the observation platforms. The pad is not far from the beach, one of the last stretches of Florida coastline unblemished by hotels and condos. Beach houses were torn down years ago when the federal government showed up with rockets. Old-timers talk of 11 graveyards and an old schoolhouse lurking somewhere out there, the remnants of the era before the coming of the spaceport. Now the U.S. space program itself is middle-aged, facing a painful transition. Atlantis will blast off, if all goes as planned, at 11:26 a.m. Friday for a 12-day mission to the international space station. And then . . . what? NASA's critics say the human spaceflight program is in a shambles. They see arm-waving and paperwork rather than a carefully defined mission going forward. NASA has lots of plans, but it has no new rocket ready to launch, no specific destination selected, and no means in the near term to get American astronauts into space other than by buying a seat on one of Russia's aging Soyuz spacecraft. The space agency's leaders say everything's on track, that the private sector will soon launch astronauts into orbit and let NASA focus on the hard work of deep-space exploration. There is a new heavy-lift rocket in the works, one capable of going far beyond the stamping grounds of the shuttle. President Obama has picked a destination, a near-Earth asteroid, though he did not say which one. Bob Crippen, who was the pilot of the first shuttle mission, STS-1, back in 1981: "I've never seen NASA so screwed up as it is right now. . . . They don't know where they're going." Even one of NASA's senior people here at the Kennedy Space Center, Mike Leinbach, the launch director who will supervise the final countdown and launch of Atlantis, has blasted his agency for the lack of direction. "We're all victims of poor policy out of Washington, D.C. — both at the NASA level and the executive branch of the government," Leinbach said recently at a news conference here. He said he was "embarrassed" about the lack of guidance. NASA Administrator Charles F. Bolden Jr. said he respects Crippen and Leinbach but "could not disagree more" with their comments. "Our future is bright, and the U.S. will continue to be a world leader in space exploration for many years to come," he said. Here at the Kennedy Space Center, NASA managers say they plan to build a "21st-century spaceport," but the effort has a cart-before-horse problem. NASA is trying to get infrastructure in place for rockets that haven't been approved and destinations that haven't been selected. The space center has a new half-

billion-dollar mobile launcher, soaring 355 feet into the air and designed for Constellation's Ares I rocket. But with Ares I defunct, the launcher is an expensive piece of hardware searching for a purpose. One of the powerful impressions of the Kennedy Space Center is how antiquated the place has become in certain respects. It's not digital, it's analog. The Kennedy Space Center wants to be a 21st-century spaceport, but there are places where it looks like the Rust Belt of the Space Age. The massive structure housing the Delta IV is a reminder that the space program is hardly dead. The U.S. military spends more on space than NASA does. The future promises many rockets, big and small, civilian and military, public and private. Web posted. (2011). [Final NASA shuttle mission clouded by rancor [Online]. Available WWW: http://www.washingtonpost.com/ [2011, July 2].]

**July 3: After last shuttle flight, NASA will focus on 'deep space'**

NASA Administrator Charles Bolden says that human space flight for America will not end with the retirement of the shuttle program. Instead, the space agency plans to refocus its efforts from lower-orbit vehicles to deeper space probes. Bolden touted two new NASA programs that will eventually "open up the entire solar system to us." A Multi-Purpose Crew Vehicle will carry four astronauts for 21-day deep space missions, and will be able to land in the Pacific Ocean. "It is designed to be much safer during ascent and entry than the shuttle," Bolden said. NASA is near a decision and announcement on a new heavy-lift rocket space launch system. Shuttle Atlantis is scheduled for liftoff on July 8 for a 12-day mission to the International Space Station, marking the final flight for the shuttle program. Last week, former astronaut John Glenn expressed his unhappiness with the end of the shuttle program. Glenn called it "ridiculous" and says he has objected to the cancellation since President George W. Bush made the announcement back in 2004. Web posted. (2011). [After last shuttle flight, NASA will focus on 'deep space' [Online]. Available WWW: http://www.cnn.com/ [2011, July 3].]

**July 4: Shuttle Atlantis astronauts arrive for Friday's launch**

The crew of the shuttle Atlantis celebrated the July Fourth holiday Monday by flying to Florida aboard sleek T-38 jet trainers to prepare for launch Friday on the 135th and final shuttle mission. After a brief stop in Mobile, Ala., to refuel, commander Christopher Ferguson, pilot Douglas Hurley, Sandra Magnus and Rex Walheim touched down at the 3-mile-long shuttle runway around 2:32 p.m. EDT (GMT-4). The shuttle's countdown is scheduled to begin at 1 p.m. Tuesday, setting up a launch attempt at 11:26:46 a.m. Friday, roughly the moment Earth's rotation carries launch complex 39A into the plane of the International Space Station's orbit. The astronauts have until Sunday to get off the ground or launch will slip to July 16 to give the Air Force time to launch a navigation satellite aboard a Delta 4 rocket. Assuming an on-time liftoff, Ferguson will guide Atlantis to a docking at the station's forward port around 11:09 a.m. Sunday. A cargo module loaded with more than 8,000 pounds of supplies and equipment will be attached to the station the next day, followed by a spacewalk Tuesday with station astronauts Ronald Garan and Michael Fossum. If all goes well, Atlantis will undock around 1:51 a.m. July 18 and land back at the Kennedy Space Center around 6:56 a.m. on July 20 to close out the orbiter's thirty-third and final flight. "It's such a pleasure to come down here when you have a rocket on the pad and it's got your stuff loaded on it," Walheim said on the shuttle runway. "So we're really excited to be here. I thank you all for coming out and I hope you have a happy Fourth of July." Web posted. (2011). [Shuttle Atlantis astronauts arrive for Friday's launch [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, July 4].]

**With shuttle program ending, it's time to see what space station can do**

If the American public can't get excited over research breakthroughs in salmonella vaccines, how microgravity affects the human immune system and cosmic-particles analysis, this could be a difficult decade for supporters of NASA's manned spaceflight program. Once space shuttle Atlantis delivers a pod of equipment and supplies to the International Space Station and returns to Earth later this month, the 13-year construction phase of the station — like the shuttle program that made it possible — will be over.

The station, longer than a football field and costing an estimated $100 billion, is the shuttle program's ultimate legacy. Now it's time to see what the station can do. "We believe this next 10 years it's important to do meaningful science," said Frank DiBello, president of Space Florida, the public-private agency designed to promote space-related economic development. "That's a 10-year period in which the nation is going to look at what kind of return on investment can be achieved for the $100 billion." The challenge for NASA and its international, corporate and scientific partners in coming years: Can meaningful science be carried out more than 200 miles above Earth's surface? The first parts of the station were put into orbit in 1998, and research has been under way since the first residents — initially, only three members — arrived in 2000. But it wasn't until this year that the crew — now up to six, thanks to expanded living quarters — began focusing on what NASA calls its "utilization phase." The station is set to last at least another 10 years, relying on Russian Soyuz spacecraft for supplies and crew transport until private U.S. firms can take over. Meanwhile, NASA will refocus its manned spaceflight program on more distant destinations such as Mars, asteroids or the moon. About 120 science projects are under way on the station now, involving more than 600 scientists on Earth. The station has four users. A partnership of the European Space Agency, Japan, Russia, Canada, Brazil and others, controlled by an international board, uses about a quarter of the station's resources and astronaut time. The rest is divided between NASA, the U.S. Department of Defense and a NASA-administered national laboratory open to private companies, universities and individual scientists. Web posted. (2011). [With shuttle program ending, it's time to see what space station can do [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, July 4].]

**July 5: Weather Iffy for NASA's Last Space Shuttle Launch Friday**

NASA is counting down toward launch the agency's final space shuttle mission on Friday (July 8), but Mother Nature may not cooperate. The countdown began this afternoon (July 5) and is ticking down to a planned zero at 11:26 a.m. EDT (1526 GMT) on Friday, but NASA is keeping a close eye on the weather. Forecasts call for a chance of rain and thunderstorms on Friday, meaning that shuttle Atlantis' final mission — the last ever for NASA's iconic shuttle program after 30 years of spaceflight — might be delayed, officials said today in a news briefing here at NASA's Kennedy Space Center. "I wish I had better weather for you, a better weather briefing for you," said shuttle weather officer Kathy Winters. "Right now, we're going with a 60 percent chance of KSC weather prohibiting launch due to the potential for showers and isolated thunderstorms in the area." NASA's preparations, for their part, are coming along nicely, with no problems apparent at the moment. "All of our preparations for launch countdown have been completed or are in work, and we're working no issues at this time," said Jeremy Graeber, NASA test director. Atlantis' payloads, which include a year's worth of supplies and spare parts for the International Space Station and an experiment to demonstrate robotic refueling of satellites in orbit, are also looking good, officials said. And Atlantis' four-astronaut crew is on site and working through their flight preparations. Commander Chris Ferguson, pilot Doug Hurley and mission specialists Rex Waldheim and Sandy Magnus flew in to KSC yesterday afternoon from Houston's Ellington Field, arriving aboard two T-38 supersonic jets. If bad weather scrubs Friday's launch, other windows open up Saturday morning and Sunday morning. And the outlook improves a bit each day, with the chance of weather problems dropping to 40 percent on Saturday and 30 percent on Sunday, Winters said. A delay would doubtless disappoint the huge throngs of shuttle-watchers that will descend on Florida's Space Coast to watch the last-ever blastoff of America's iconic space plane. NASA expects between 500,000 and 750,000 people to show up, Graeber said. Atlantis' STS-135 mission is slated to last 12 days to deliver supplies and spare parts to the International Space Station. NASA will retire its three-shuttle fleet for good to make way for a new program aimed at deep space exploration. The space agency aims to send and then on to Mars by the mid-2030s. Atlantis and its fellow orbiters Endeavour and Discovery will become museum showpieces. Web posted. (2011). [Weather Iffy for NASA's Last Space Shuttle Launch Friday [Online]. Available WWW: http://www.space.com/ [2011, July 5].]

**Prices of collectibles jump at space shuttles' end**

With the shuttle program set to end this month, collectors say they're already seeing more interest in items ranging from autographed crew photographs to small flags that flew into space. Robert Pearlman, editor of collectspace.com, said it's difficult to put an across-the-board number on how much shuttle merchandise will increase in value, but he expects some prices to double. Part of the increase will depend on how much the last flight of Atlantis, schedule for launch Friday, will boost collector interest. Between 500,000 and 1 million spectators are expected on the Space Coast to witness the 30-year program's grand finale, suggesting the interest is there. One key to the rising value, Pearlman and other experts say, is that now there is a definitive number of shuttle missions and shuttle astronauts, so collectors know what they need to get a complete set. And many are scrambling now to fill in those missing pieces. The most valuable of the official NASA crew photos, Pearlman said, are ones signed by the crews from NASA's two shuttle tragedies: Challenger which exploded shortly after launch in 1986 and Columbia which broke apart on its way home in 2003. Some of those have sold for more than $10,000 apiece. In comparison, crew-signed photos from relatively obscure shuttle missions can be bought for $35 to $75. There also is growing interest in items that were tied to certain shuttle missions -- particularly the first shuttle mission in 1981, on Columbia. NASA put 10,000 4-inch-by-6-inch American flags on that flight. After the mission, the flags were mounted on special commemorative displays that included launch and landing photos and other information about the mission. NASA gave those flags to many of its employees, contractors and others with connections to the shuttle. Pearlman, who operates a leading website for space enthusiasts and space memorabilia collectors, said those collectibles have jumped in value, rising from $250 to $500 five years ago to more than $1,000 today. Other high-priced memorabilia include items from the inaugural flights of the other shuttle orbiters and of missions connected with the Hubble Space Telescope. Beyond photos autographed by astronauts and space-flown flags, some space collectors tend to focus on more unusual memorabilia, such as spacecraft parts, other space-flown items, and manuals used by astronauts in flight or in training. That market has raised concerns about space program employees taking space-related property home as souvenirs or to resell. But NASA spokesman Allard Beutel said those incidents are rare. "People know the difference" between personal property, such as flags or pins that were flown on the shuttle and later given out as awards, and government property, such as used shuttle heat-resistant tiles, Beutel said. Even with the end of the shuttle program resulting in thousands of layoffs and retirements at Kennedy Space Center, Beutel said he's not worried. "They're professionals, and they're good, honest people," Beutel said. He said managers and supervisors reinforce the rules, and there are various levels of security in place to track shuttle parts and other NASA property. Web posted. (2011). [Prices of collectibles jump at space shuttles' end [Online]. Available WWW: http://www.floridatoday.com/ [2011, July 5].]

**Poll finds support for U.S. space program**

Most Americans consider the space shuttle program to have been a good investment, according to a national poll released Tuesday. And they say it's "essential" for the U.S. to remain a world leader in human spaceflight. "By a relatively large margin, this is something that Americans think is important," said Jocelyn Kiley, a researcher with the Pew Research Center for the People and the Press, which conducted the survey. Fifty-eight percent of respondents called U.S. leadership in human spaceflight "essential." Thirty-eight percent said it is "not essential." The poll marked the first time Pew researchers have asked that question. In addition, 55 percent of respondents said the space shuttle program has been a good investment, a smaller percentage than expressed that view during the 1980s when three of four said they felt that way. Pew's telephone poll of 1,502 adults was conducted June 15-19. The poll had a margin of error of plus or minus 3.5 percentage points. The shuttle program retires with the final flight of Atlantis scheduled Friday. The space agency plans to hitch rides to the International Space Station aboard Russian Soyuz rockets for several years. Despite the public appetite for space exploration reflected in the Pew poll, the agency has struggled in the competition with other agencies for funding. In 2004, the last time Pew asked people to rank space exploration among priorities for Congress and the president, only one in 10 people called expanding the space program a "top priority." That ranked it 22nd behind issues such as

the economy, crime and a gay-marriage amendment. Web posted. (2011). [Poll finds support for U.S. space program [Online]. Available WWW: http://www.floridatoday.com/ [2011, July 5].]

**KSC readies for final shuttle countdown**

After a long Independence Day weekend off, Kennedy Space Center teams are back at work preparing to start the final countdown to a shuttle launch at 1 p.m. today. Atlantis and its crew of four astronauts, who arrived at Kennedy Monday, are scheduled to blast off at 11:26 a.m. Friday. NASA will host a status briefing today at 10 a.m. featuring Jeremy Graeber, NASA test director, Joe Delai, mission payload manager and Kathy Winters, shuttle weather officer. A preliminary launch weather forecast hadn't been released by 7 a.m. Launch teams plan to report to their consoles in Firing Room 4 of the Launch Control Center at 12:30 p.m. After the three-day countdown begins, processing work today includes final vehicle and facility closeouts for launch, checkout of backup flight systems, avionics configuration, review of flight software and verification of flight system software in Atlantis' general purpose computers. Atlantis will fly a minimum 12-day mission to the International Space Station to keep it stocked with food and supplies through next year. Web posted. (2011). [KSC readies for final shuttle countdown [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, July 5].]

**July 6: Stem Cells for Space Shuttle Atlantis**

One small South Florida Company with a funny name will be watching NASA's launch of STS-135, Space Shuttle "Atlantis," with more than the usual interest this coming Friday, July 8th, 2011. Miami Fat Supply, (funny name, serious business) was chosen to supply a rather unique payload for this historic last-ever shuttle flight to the International Space Station - human fat, from which stem cells are derived to study the effects of regenerative therapies on astronauts who experience muscle and organ atrophy when exposed to long periods of zero gravity. Tissue Genesis Inc. of Honolulu Hawaii, an early pioneer of stem cell research is the sponsor of this ground breaking study. TGI was selected by the Dept. of Defense to conduct this particular experiment. This is TGI's 19th shuttle payload involving regenerative cell research. Web posted. (2011). [Stem Cells for Space Shuttle Atlantis [Online]. Available WWW: http://www.PRWeb.com/ [2011, July 6].]

**Space shuttle breathed new life into Rocketdyne**

It built rocket engines mighty enough to blast Apollo skyward and beat the Soviets to the moon. But when Canoga Park-based Rocketdyne won a long-shot bid 40 years ago to help launch a re-useable NASA space shuttle, it would enter one of the greatest high-tech races ever. For its space shuttle main engine (SSME) would not only power the swiftest winged hot rod but become an uncompromising engineering wonder. "Here's what they wanted: a re-useable engine. An engine that could vary its thrust. They also wanted the highest-performance rocket engine ever made. And to make it as light as possible," said John Halchak, a metallurgical engineer with Pratt & Whitney Rocketdyne -- a senior fellow, or deacon, of modern rocketry. The Rocketdyne space shuttle engine that shot 134 space shuttles into space since 1981 has never cast an astronaut adrift. And with the final space shuttle launch scheduled Friday, the San Fernando Valley rocketeers stand to bat 1.000 for 30 years of engine reliability. "It's unique. And very complicated, more so than any other engine," said Bob Biggs, a principal engineer and author of a book on the space shuttle engine. "One more flight, and we'll have done the whole program without a catastrophic failure of the engine. "The SSME was a tremendous challenge," recalls Byron Wood, former president of Pratt & Whitney Rocketdyne, affectionately dubbed "Mr. Rocketdyne," who now lives in Santa Barbara. "To start a new program. To build an engine no one had ever built. Using technology no one had ever brought to conclusion. "Then construct a factory that would build the engines." The space shuttle engine, clustered in a trio beneath the orbiter, would have to survive 50 launches, a first. It would have to vary thrusts of up to 500,000 pounds, a first. It would have an onboard rocket engine computer, a first. It would have to have what engineers call a high enough specific impulse -- or thrust versus weight ratio -- to propel the heavy orbiter between 200 and 400 miles above the earth in a highly efficient way. And it would have to burn liquid hydrogen and oxygen at unprecedented combustion chamber pressures

of 9,000 pounds per square inch. This called for 77,000-horsepower turbine-driven fuel pumps the size of a six-cylinder car engine. Which called for a new Rocketdyne copper, zirconium and silver alloy, key to cooling the pressurized combustion chamber, to keep it from melting beneath the astronauts. The new main shuttle engine looked androgynous -- like the Terminator fused to Scarlett O'Hara in an oversize hoop skirt. At 14 feet tall and 7,500 pounds, it had 45,000 parts. It was also sensitive -- turn one knob here, get a lot of response there -- a condition known as "high gain." But it would win the hearts at NASA, who awarded its contract to Rocketdyne in July 1971. On a hot and humid day in Mississippi four years later, it was fired and tested for a half-second. "Barely audible," said Wood, who had been standing in the control room. "But it was the sound that ushered in the shuttle." Test and fix. Test and fix. By the time the Challenger was launched on April 12, 1981, its engines had exceeded 300,000 seconds on the hot-fire pad -- the equivalent of 615 space shuttle missions, according to NASA. After its first flight, NASA and the U.S. Air Force demanded its engineers squeeze out 9 percent more power -- an order almost as tall as the engine itself. Over the life of the space shuttle, Rocketdyne built 72 SSME engines, which took up to three years to make at the plant in Canoga Park. One former company engineer said early engines cost $35 million each. In Halchak's office hangs a photograph of the first moon landing with an inscription, "Once upon a time there was a nation where anything seemed possible. There still is." "We were really fortunate to live when we did," he said. "We worked through the Apollo program. The shuttle program. We put guys on the moon. We built a space station. "These were the glory days -- not just for this company, but for this country. We could do anything." Web posted. (2011). [Space shuttle breathed new life into Rocketdyne [Online]. Available WWW: http://www.dailynews.com/ [2011, July 6].]

**Canaveral-based Guardsmen watch for off-limits boaters**

It could be quite the traffic jam. Anywhere from 2,000 to 5,000 boats are expected to jockey for the best viewing spots on the Atlantic Ocean and Banana River to watch the launch of Atlantis on Friday. But boaters beware: Violate the off-limits security zone and face a fine as hefty as $40,000. Willfully violate the zone, and the penalty could be as much as $250,000, up to 10 years in prison, or both. Led by the Coast Guard, a crew of 120 on a few dozen boats will be responsible for keeping clear a massive area of water around the launch site, including inland waterways. "We get a lot of people that are going out for the day," Petty Officer 1st Class Robert Martin said. "They don't have a marine radio. It's the private boater who may put their boat on auto-pilot and forget about it, then all of a sudden they have a helicopter hovering over them." Coast Guard crews and partner agencies began patrolling Tuesday to make sure no one violates the security zone that stretches 22 miles along the coast north of Port Canaveral and three miles into the Atlantic Ocean. An additional federal safety zone stretches 12 miles out to sea and is in effect 45 minutes before launch through 15 minutes afterward. Chief Warrant Officer Jim Dubea, commanding officer of Coast Guard Port Canaveral, said the safety zone exists for the protection of the shuttle and its crew, as well as the safety of boaters. The launch of Atlantis, the final shuttle flight, is expected to draw more than twice the number of boaters as previous launches. Some will be inexperienced and others will be unfamiliar with the restrictions. Violators have forced launch delays. The April 12, 1985, launch of STS 51-D was delayed 55 minutes when a ship entered a restricted solid rocket-booster recovery area, which is in the federal zone. A similar incident occurred on Aug. 27, 1985, delaying the launch three minutes, 1 second. Crews mobilized in 1999 upon a sailboat that strayed into the restricted area. The Coast Guard ordered the man on the sailboat to anchor the vessel. They then took him off the boat and out of the safety zone and the launch proceeded as scheduled. At dusk one day before a shuttle launch, six people rode personal watercraft seemingly without a care in a restricted security zone in the Banana River. The past six years, about 350 violations of the safety zone have been recorded, all were warned to stay away. Thirteen have been repeat offenders. "If we warned you once and you come back, you're going to get our attention," said Senior Chief Mark Carstens, program manager for Coast Guard Space Flight Security Office at Port Canaveral,. Carstens has worked enforcing waterway restrictions for 21 shuttle launches and 42 rocket launches in his 16 years stationed at Port Canaveral. Usually a warning over the radio to mariners will prompt them to quickly move out of the zone, but not

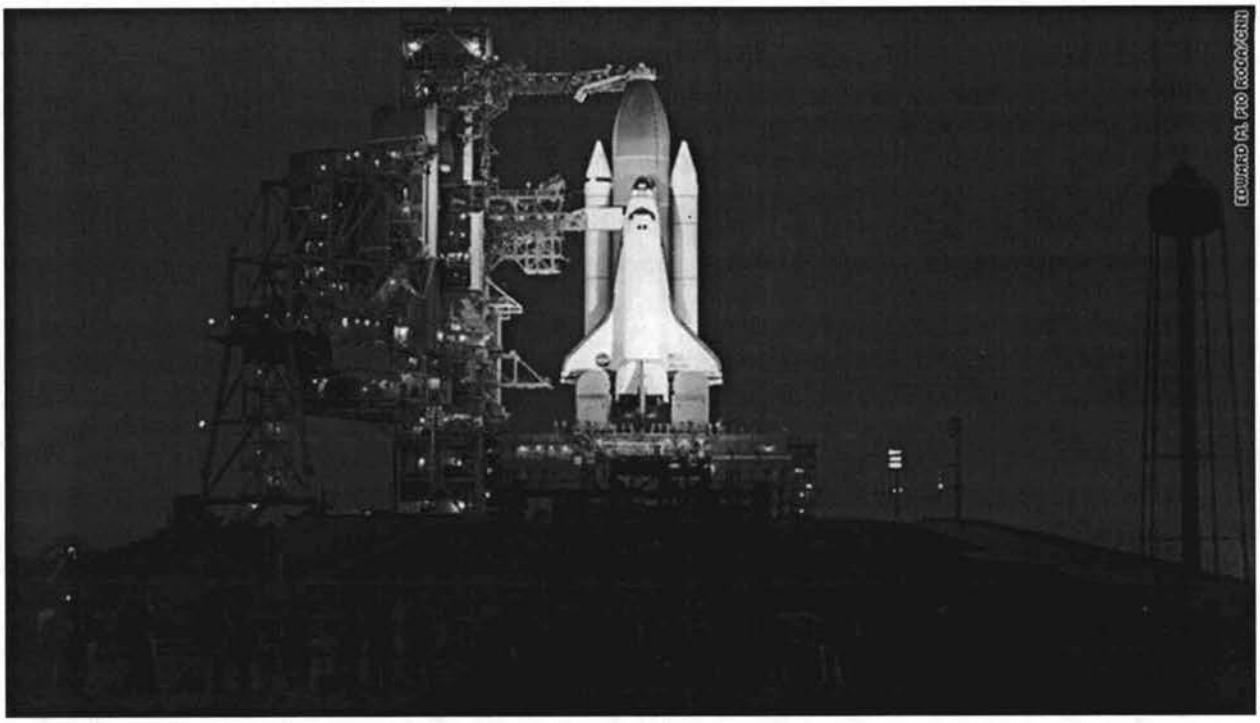
all have radios. For launches, the Coast Guard, which is the primary law enforcement agency on the water, calls in reinforcements from its reserve and auxiliary, plus works with marine crews from the Brevard County Sheriff's Office, Florida Fish and Wildlife Conservation Commission, U.S. Customs and Border Enforcement and the Air Force Reserve 920th Rescue Wing. Web posted. (2011). [Canaveral-based Guardsmen watch for off-limits boaters [Online]. Available WWW: http://www.floridatoday.com/ [2011, July 6].]

**July 7: NASA Signs Commercial Space Agreement With Sierra Nevada**

NASA's Kennedy Space Center in Florida is entering into an agreement with Sierra Nevada Space Systems (SNSS) of Sparks, Nev., to offer technical capabilities from the center's uniquely skilled work force. The umbrella space act agreement is Kennedy's latest step in its transition from a historically government-only launch complex to a multi-user spaceport. "We're pleased that our partner Sierra Nevada is going to make use of the deep resources existing at the Kennedy Space Center to enhance its ongoing work," said NASA Administrator Charles Bolden. "Sierra Nevada's agreements with Kennedy and other NASA centers demonstrate its commitment to using the full resources of NASA as the agency facilitates commercial cargo and crew capabilities to the International Space Station." Kennedy will help Sierra Nevada with the ground operations support of its lifting body reusable spacecraft called "Dream Chaser," which resembles a smaller version of the space shuttle orbiter. The spacecraft would carry as many as seven astronauts to the space station. Through the new agreement, Kennedy's work force will use its experience of processing the shuttle fleet for 30 years to help Sierra Nevada define and execute Dream Chaser's launch preparations and post-landing activities. "The partnership is an effort to bring new commercial space activities to the center and help transition Kennedy from a government, program-focused, single user launch complex to a diverse, multi-use spaceport, enabling both government and commercial space providers," said Kennedy Center Director Bob Cabana. Web posted. (2011). [NASA Signs Commercial Space Agreement With Sierra Nevada [Online]. Available WWW: http://www.spaceref.com/ [2011, July 7].]

**NASA Prepares For Final Shuttle Fuel-Loading**

NASA engineers aim to start fueling the external tank of shuttle Atlantis early Friday, a move that would keep the agency on course for the nation's 135th and final shuttle launch despite stormy weather and a grim forecast. Atlantis and four astronauts remain scheduled to launch at 11:26 a.m. Friday, and an initial review of lightning strikes near the pad today have raised no red flags. One bolt struck the water tower about 500 feet of the shuttle at Kennedy Space Center's launch pad 39A. A second hit the beach and two more were recorded within close proximity of the shuttle. Lightning strikes can prompt NASA to order up retesting of shuttle electrical systems to make sure all still are working as intended -- tests that potentially could prompt a delay in launch. However, the initial analyses indicated that no extensive retesting will be required. NASA engineers will brief senior mission managers on the lightning strikes during an internal meeting at 1:30 a.m. A decision on whether to proceed with external-tank propellant-loading operations -- the next big milestone in the countdown for launch Friday -- will be made at that time. The weather forecast for launch still calls for a 70 percent chance rain showers and thunderstorms will prohibit launch. Web posted. (2011). [NASA Prepares For Final Shuttle Fuel-Loading [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, July 7].]



**Most memorable space shuttle moments**

For more than 30 years, America's space shuttles have rocketed into orbit. Columbia, Challenger, Discovery, Atlantis and Endeavour blasted off 134 times from the Kennedy Space Center. They were mankind's first reusable space launch vehicles, and the first to glide back to Earth on wings. As the space shuttle program ends with the final flight of Atlantis, CNN looks back at key moments that have defined this pioneering space program. First shuttle mission - After several years of delays, as well as a computer malfunction the day before, America rocketed into the space shuttle era on the morning of April 12, 1981. The shuttle had been through many tests, but for Columbia's first launch into space, Commander John Young and Pilot Robert Crippen were in the cockpit. Shuttle firsts - The shuttles have launched many "firsts" into space. Physicist Sally Ride became the first American woman in space in 1983. At age 32, she also holds the record for the youngest astronaut. That same year, Air Force Col. Guion Bluford Jr. became the first African-American in space. In 1983, Ulf Merbold, from West Germany, became the first non-American to fly on the shuttle. The first member of royalty and the first Muslim in space was Sultan Bin Salman Bin Abdulaziz Al Saud in 1985. Medical doctor Mae Jemison became the first African-American woman in space in 1992. After the collapse of the Soviet Union, Sergei Krikalev became the first Russian to fly on a space shuttle in 1994. Air Force Col. Eileen Collins became the first woman to pilot the shuttle in 1995, and four years later she was the first to command a mission. Challenger disaster – January 28, 1986, at 11:38 am ET, space shuttle Challenger blasted off from Kennedy Space Center. One minute and 13 seconds later, the ship was engulfed in a fireball which destroyed Challenger and claimed the lives of all onboard. NASA later determined the accident was caused when an O-ring in one of the white solid rocket boosters failed because of unusually cold weather. Mir Space Station – Built by the Soviet Union, the Mir Space Station opened its doors to the American space shuttle in 1995. The shuttle visited the station 10 times and American astronauts spent nearly 1,000 days on board. The Shuttle-Mir program laid the cooperative and scientific groundwork for the much larger international space station that came later. During the visits, crews and their corresponding ground teams worked out everything from how to dock two different spacecraft together, to how to bathe on long duration flights. Web posted. (2011). [Most memorable space shuttle moments [Online]. Available WWW: http://www.cnn.com/ [2011, July 7].]

**July 8:** **Atlantis launches on final mission**

Thirty years and 135 missions after its debut, NASA launched a space shuttle for the final time on Friday as Atlantis streaked into orbit from Kennedy Space Center. The mission was the 33rd for Atlantis which first flew on Oct. 3, 1985 on a Department of Defense flight. The 11:29 a.m. liftoff thrilled a crowd estimated at nearly one million people who packed viewing sites along the Space Coast for one last look at a spaceship that captured the imagination and attention of fans around the world. But because of the vast expense necessary to maintain and fly the shuttle fleet it was decided the craft had outlived its usefulness and it was brought to an end in a decision that will be debated in space circles for decades to come. One of the points of contention is the shuttle should have been flown until a successor was in place to both guarantee the nation's leadership position in space and human access to space not to mention thousands of jobs that were lost at KSC. With the International Space Station having years remaining in its lifetime, U.S. astronauts will reach the outpost on Russian Soyuz rockets at least through 2016. Atlantis and its crew of four veteran astronauts is scheduled to dock with the station about 11 a.m. on Sunday to carry out its re-supply mission. Undocking is scheduled for about 2 a.m. on July 18 and landing for July 20 at KSC where the shuttle program will officially end with the call of wheel stop. Atlantis is destined for its new home in a $20 million building at the KSC Visitor Complex. Web posted. (2011). [Atlantis launches on final mission [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, July 8].]

**Famous "Last" Words for the Shuttle Program**

Friday July 8, 2011 was a significant historic day for NASA – one that will go down in history as the day of the final space shuttle launch. Here are a few of the historic "last" words spoken by the launch control team and the astronauts just before Atlantis headed off into history, as well as words from some other notable folks after the launch: Launch director Mike Leinbach's send-off: "OK, Fergie, (commander Chris Ferguson) we're starting to feel pretty good here on the ground about this one today, so on behalf of the greatest team in the world, good luck to you and your crew on the final flight of this true American icon. And so for the final time, Fergie, Doug, Sandy and Rex, good luck, Godspeed and have a little fun up there." In reply, Ferguson said, "Hey, thanks to you and your team, Mike and until the very end, you all made it look easy. The shuttle's always going to be a reflection of what a great nation can do when it dares to be bold and commits to follow through. We're not ending the journey today, Mike, we're completing a chapter of a journey that will never end. You and the thousands of men and women who gave their hearts, souls and their lives to the cause of exploration. Let's light this fire one more time, Mike, and witness this nation at its best." Web posted. (2011). [Famous "Last" Words for the Shuttle Program [Online]. Available WWW: http://www.universetoday.com/ [2011, July 9].]

**President Obama congratulates shuttle team, vows "next era"**

President Barack Obama released the following statement about today's launch of the space shuttle Atlantis and the closing of NASA's 30-year shuttle program: "Today, Americans across the country watched with pride as four of our fellow citizens blasted off from the Kennedy Space Center in the Space Shuttle Atlantis, and America reached for the heavens once more. Behind Atlantis and her crew of brave astronauts stand thousands of dedicated workers who have poured their hearts and souls into America's Space Shuttle program over the past three decades. To them and all of NASA's incredible workforce, I want to express my sincere gratitude. You helped our country lead the space age, and you continue to inspire us each day. Today's launch may mark the final flight of the Space Shuttle, but it propels us into the next era of our never-ending adventure to push the very frontiers of exploration and discovery in space. We'll drive new advances in science and technology. We'll enhance knowledge, education, innovation, and economic growth. And I have tasked the men and women of NASA with an ambitious new mission: to break new boundaries in space exploration, ultimately sending Americans to Mars. I know they are up to the challenge – and I plan to be around to see it. Congratulations to Atlantis, her astronauts, and the people of America's space program on a picture-perfect launch, and good luck on the rest of your mission to the International Space Station, and for a safe return home. I know the American

people share my pride at what we have accomplished as a nation, and my excitement about the next chapter of our preeminence in space." Web posted. (2011). [President Obama congratulates shuttle team, vows "next era" [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, July 8].]

**Feeding astronauts a 'dream job' for Titusville woman**

For 24 years, Dotti Kunde was among a handful of people lucky enough to spend time with the astronauts in the hours before they boarded the shuttle. She wasn't a high-up executive for NASA. She wasn't part of the team who helped the astronauts get suited up and she wasn't a member of the close-out crew. Kunde was one of the women responsible for feeding the astronauts in crew quarters before they embarked on their journey. "We in the kitchen are probably some of the last people they kiss and hug before they leave," Kunde, 86, said. "We say, 'Have a safe journey. See you when you get back. We'll be here.' " Kunde retired from the "dream job" about three years ago. She has since written two cookbooks about her time baking cookies, whipping up omelets and grilling steaks for the people she considered family. "To me I felt like they were my children," Kunde said. "They would come in the kitchen and steal cookies while we were baking and there were certain things they couldn't have and we would say 'No, you can't have that.' " As the shuttle program comes to an end, Kunde reflected on the career that flourished after responding to a nondescript newspaper ad looking for a food service technician to work three days a week. "It was like a dream," Kunde said. "As I think back now, I feel like I was a very lucky person." Web posted. (2011). [Feeding astronauts a 'dream job' for Titusville woman [Online]. Available WWW: http://www.floridatoday.com/ [2011, July 9].]

**Final launch attracts dreamers, space-program veterans**

Hoping to fulfill childhood dreams, cross off an item on their bucket lists or relive memories, hundreds of thousands of people flocked to the Space Coast on Friday to witness the space shuttle program's final flight. They came from all over Florida and the nation, not even sure whether their hours of traveling and camping out would pay off. As late as Friday morning, Atlantis only had a 30 percent chance of liftoff. But the weather cleared just enough, and the shuttle flew. The nearby causeway turned into a jammed sea of pedestrians, some of whom had walked for miles after parking their cars along U.S. Highway 1. Others stood in the river hoping to get an unobstructed view. During the hours of waiting, friendships were forged and e-mail addresses exchanged as shuttle watchers began sharing their life stories with strangers. As it got closer to launch time, the mood turned increasingly jubilant. People cheered and clapped. But for some, the long wait had started to take its toll. A boat in the river threatened to block people's view. "Move the boat!" some began chanting. "Move the boat!" It did move, a little. Bad feelings faded fast as Atlantis lifted into the sky. People cheered and cried. "Godspeed and good luck!" someone called out. Someone remarked that it was too bad the clouds blocked the view. But that really didn't matter. "It brings tears to your eyes," said Marshall Stauber, an orthopedic surgeon from Hollywood. "It's beautiful, I'll tell you." Web posted. (2011). [Final launch attracts dreamers, space-program veterans [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, July 8].]

**Everyone has an opinion:**

One thing about the end of space shuttle flight: Everyone has an opinion. A look at some of the views from those close to the space program:

"The shuttle is always going to be a reflection of what a great nation can do when it dares to be bold and commits to follow through." —Atlantis commander Christopher Ferguson just before launch.

"We've got a lot of work to do. We've got another program that we've got to get under way. ... We know what we're doing. We know how to get there. We've just got to convince everybody else that we know what we're doing." —NASA Administrator Charles Bolden to workers after liftoff.

"Those vehicles, in my opinion, could fly for another 30 years and could be flown safely." —Robert Crippen, pilot of the first space shuttle flight.

"NASA doesn't have a story right now. Exploration is nothing if not the articulation of a great story."

— Astronaut John Grunsfeld, who helped repair the Hubble Space Telescope three times.
"I think the shuttle program is ending exactly as it should. We built the International Space Station... and we finished really strong." —Mike Moses, chairman of the mission management team for liftoff.
"People wanted to get rid of the space shuttle and so they have done so. They have done so in condemning it in many different ways, all of which in my opinion were false." —Christopher Kraft, founder of Mission Control.
"There is no embarrassment in setting the bar impossibly high and then failing to clear it. What matters is that we strived mightily to do so." —Astronaut Duane Carey.
"The biggest spinoff (of the shuttle program) in terms of belief in a better future — the adrenaline we get from doing something other than dropping bombs." — Astronaut Mae Jemison, first black woman in space.
"It's a strategic mistake for the United States ... to replace the space shuttle for nothing."— Former NASA Administrator Michael Griffin.
"I gotta get back to work. We've got a lot more work to do." — Garrett Reisman, ex-astronaut and commercial crew manager for Space Exploration Technologies Corp., which is developing new spacecraft and rockets.
"When we look back on it I think it was the perfect vehicle for its time." — John Glenn, the first American in orbit, who also flew a shuttle in 1998.
"It'll be sad to see it retired. But we are looking forward to new spacecraft, new destinations. We're all excited about the future."—Mark Kelly, commander of the next-to-last-space shuttle flight.
"Winston Churchill said: 'This is not the end. This is not even the beginning of the end. It is perhaps the end of the beginning.' That's what I think of all the time... We're going to the next chapter." — NASA chief technology officer Bobby Braun.
"It's the end of a career, not the beginning of a new one. What we lack is the beginning of a new one." — George Mueller, former NASA official often called the father of the space shuttle program. Web posted. (2011). [Everyone has an opinion: Some call shuttle 'perfect vehicle;' others look to new destinations [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, July 8].]

**Movie filmed as space shuttle Atlantis took off**

A movie starring actor Jason Ritter was being filmed as space shuttle Atlantis lifted off from Kennedy Space Center. "Atlantis" is being filmed in central Florida. It's about strangers who meet and fall in love during the buildup to the final space shuttle launch. Filming took place on a dock at Space View Park while the shuttle lifted off Friday in the background. This was the first launch for Ritter and actress Kate French. Ritter, son of the late actor John Ritter, said it was "an important moment in time to capture." Space Coast Film Commissioner Bonnie King told *Florida Today* she was pleased that a film was being shot locally that focused on the final shuttle launch. King called it "a tribute to the final shuttle launch." Web posted. (2011). [Movie filmed as space shuttle Atlantis took off [Online]. Available WWW: http://www.wtsp.com/ [2011, July 9].]

**July 9: Space station set to host last shuttle today**

Four Atlantis astronauts are closing in on the International Space Station this morning, aiming to become the last shuttle crew to dock at the sprawling orbital research complex. After approaching within 600 feet, Atlantis commander Chris Ferguson about 10 a.m. will guide the orbiter through one of its most dramatic in-space maneuvers, a backflip that will help reveal the condition of its heat shields. Then just after 11 a.m., Atlantis should ease into its port at the station's Harmony node to complete the 37th shuttle visit to the $100 billion outpost since its assembly began in 1998. The joining of the two spacecraft 240 miles above Earth will be one of the defining moments in the 135th and final shuttle mission, said Kwatsi Alibaruho, the lead shuttle flight director. "That will be a significant hurdle as far as accomplishing the mission and concluding it safely," he said. A successful docking would complete an extremely smooth first two days to the mission since its launch from Kennedy Space Center on Friday. Atlantis is performing flawlessly on its 33rd flight since 1985, with no reported glitches. Web posted. (2011).

[Space station set to host last shuttle today [Online]. Available WWW: http://www.floridatoday.com/ [2011, July 9].]

**Atlantis boosters return to port Sunday**

The last two solid rocket boosters to launch with a shuttle are expected to return to the Space Coast Sunday, according to United Space Alliance, whose crews recover the boosters at sea. The recovery ship Liberty Star will be first back with one booster. It's expected to arrive at the Port Canaveral jetty around noon and continue through the locks a few hours later on its way to Hangar AF at Cape Canaveral Air Force Station. The Freedom Star will follow in the evening with the second booster, with a jetty arrival very tentatively planned around 8 p.m. It will dock overnight and pass through the locks early Monday. Difficult weather conditions slowed recovery of the boosters from the Atlantic about 140 miles down range, off the coast of Jacksonville. The two boosters provide more than 80 percent of the shuttle's thrust at liftoff and during the first stage of ascent. The separate two minutes into flight and splash down after seven minutes. It's not yet known if the largest solids boosters ever flown have done so for the last time, or if they might be reused on a heavy-lift rocket NASA plans to build. Web posted. (2011). [Atlantis boosters return to port Sunday [Online]. Available WWW: http://www.floridatoday.com/ the flame trench blog [2011, July 9].]

**Astronauts give Atlantis full post-launch inspection**

The Atlantis astronauts inspected the shuttle's heat shield Saturday and fine tuned the shuttle's approach to the International Space Station, setting their sights on docking at the lab's forward port around 11:07 a.m. EDT (GMT-4) Sunday. Flight Director Kwatsi Alibaruho told reporters that Atlantis, making its 33rd and final flight, is operating in near flawless fashion, allowing the crew to work at peak efficiency. "On this, the last shuttle mission of the program, I'm very grateful the spacecraft is behaving as well as it is so we can finish strong, finish safely," he said. "My team's number one focus is on ending this mission and ending the program as safely as we have flown past missions. The great condition of the spacecraft is really helping us to do that so far." Space shuttles normally fly with crews of six or seven, but just four are flying aboard Atlantis -- commander Christopher Ferguson, pilot Douglas Hurley, Sandra Magnus and Rex Walheim -- to minimize rescue scenarios in case of a major problem that might prevent a safe re-entry. But on the flip side, there are fewer hands available to do the same amount of work. "It will be challenging to get through that inspection with a reduced crew complement," said Alibaruho said before launch. "But this crew has practiced considerably to be able to develop a flow or a routine, if you will, to where even though they have fewer hands available in the shuttle they'll be able to get through these inspections in the timeframe that's been allotted." The crew did better than that, finishing well ahead of schedule. The goal was to inspect the shuttle's heat-resistant nose cap and wing leading edge panels, which experience the most extreme heating during re-entry, to make sure no damage was incurred during launch Friday. Using an instrumented boom attached to the end of Atlantis' 50-foot-long robot arm, the astronauts inspected the right wing first, followed by the nose cap and then the left wing. Based on a preliminary assessment of photographs and video taken during Atlantis' climb to space Friday, "we also saw very good debris performance from the tank on the way up hill," he said. "That also was very encouraging to us. We were extremely happy with the launch yesterday as you can imagine." All in all, he said, "this is certainly one of the better starts (to a shuttle mission) that we have seen." Web posted. (2011). [Astronauts give Atlantis full post-launch inspection [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, July 9].]

**July 10: Shuttle's last hookup: Hugs, kisses and emotion**

As the miles melted between Atlantis and the International Space Station, the emotions grew — in orbit and on the ground. At Mission Control on Sunday, lead flight director Kwatsi Alibaruho declared "this is it" as he gave the OK for the final docking in space shuttle history. Flashbacks to the shuttle's very first space station docking — with Russia's Mir in 1995 — flooded his mind as viewed the shuttle on the screens. He was a NASA trainee back then. About 240 miles above the Pacific, the station's naval bell

chimed a salute — one of many landmarks, or rather spacemarks, of this final two-week shuttle mission that are being savored one by one. "Atlantis arriving," called out space station astronaut Ronald Garan Jr. "Welcome to the International Space Station for the last time." "And it's great to be here," replied shuttle commander Christopher Ferguson. Cries of joy and laughter filled the connected vessels once the hatches swung open and the two crews — 10 space fliers altogether representing three countries — exchanged hugs, handshakes and kisses on the cheek. Cameras floated everywhere, recording every moment of the last-of-its-kind festivities. Atlantis, carrying a year's worth of supplies, is being retired after this flight, the last of the 30-year shuttle program. "I won't say that I got close to welling up in the eyes, but I will say that it was a powerful moment for me," Alibaruho later told reporters. He tried to keep his feelings discreet so as not to distract his team of flight controllers, but said, "I know they were all feeling very similar emotions, thinking about where we've come from, how much we've accomplished ... what's coming next." Alibaruho said the moment was also powerful for the 10 people in space for the docking: six Americans, three Russians and one Japanese. "You could sense a palpable increase in emotion from all of the crew members, not just our U.S. astronauts," he said. "They were extremely happy and really elated to see their visitors, and I know that they really recognize and appreciate the significance of these moments." This was the 46th docking by a space shuttle to a space station. Ferguson was at the controls as Atlantis drew closer, leading the smallest astronaut crew in decades. Only four are flying aboard Atlantis, as NASA kept the crew to a minimum in case of an emergency. In the unlikely event that Atlantis was seriously damaged, the shuttle astronauts would need to move into the space station for months and rely on Russian Soyuz capsules to get back home. A shuttle always was on standby before for a possible rescue, but that's no longer feasible with Discovery and Endeavour officially retired now. Two days into this historic voyage — the 135th in 30 years of shuttle flight — Atlantis was said by NASA to be sailing smoothly, free of notable damage. Sunday's docking proved to be as flawless as Friday's liftoff. Atlantis and its crew will spend more than a week at the orbiting complex. The shuttle flight currently is scheduled to last 12 days, but NASA likely will add a 13th day to give the astronauts extra time to complete all their chores. As for the shuttle's failed computer, Alibaruho said a bad switch throw likely knocked it offline. He expects it to be working again once new software is installed Monday. The shuttle has five of these main computers; the check-and-balance network provides redundancy during the most critical phases of the mission, especially launch and landing. Web posted. (2011). [Shuttle's last hookup: Hugs, kisses and emotion [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, July 10].]

**July 11: NASA extends shuttle mission one day**

The space shuttle Atlantis will be in space for one more day than originally planned, NASA announced Monday. The shuttle, which was scheduled to land July 20, will now make what NASA called a night landing at Kennedy Space Center at 5:56 a.m. July 21. Atlantis lifted off Friday on NASA's final space shuttle mission. On board is a four-person team: mission commander Christopher Ferguson, pilot Doug Hurley and mission specialists Sandy Magnus and Rex Walheim. The crew of veteran astronauts docked Sunday at the International Space Station to deliver a load of supplies. Web posted. (2011). [NASA extends shuttle mission one day [Online]. Available WWW: http://www.cnn.com/ [2011, July 11].]

**Liberty Star picks up rocket booster**

Two reusable solid rocket boosters that helped propel Atlantis on the nation's 135th and final shuttle flight should be back on the Space Coast today. A special water cannon salute welcomed the Liberty Star as it cruised into Port Canaveral on Sunday with the shuttle's right solid rocket booster in tow. The Freedom Star and the left-hand booster were expected to be in port late Sunday or early today. NASA and manufacturer ATK offload boosters at Hangar AF at Cape Canaveral Air Force Station. There, the boosters are put in stands and engineers and technicians make certain they are safe for workers to handle. Initial post-flight inspections are done, and then the boosters receive the ultimate pressure-washing -- a 'hydrolasing' process that removes thermal protection system foam from the rockets. Ultimately, the segmented boosters are disassembled. Then the segments are shipped by rail back to ATK's manufacturing plant in Utah. The Atlantis boosters are destined to make that trip, too. Web posted.

(2011). [Liberty Star picks up rocket booster [Online]. Available WWW: http://www.floridatoday.com/ [2011, July 11].]

**Failed Shuttle Atlantis Computer Recovered**

A failed shuttle computer was resuscitated today as the Atlantis astronauts bolted a supply-filled Italian moving van onto the U.S. side of the International Space Station. The faulty General Purpose Computer is one of five on the shuttle. It failed prior to the Atlantis rendezvous and docking at the station Sunday. A glitchy switch was blamed. Flight controllers reinstalled software on the computer today and put it back into operation along with the other four data processors. A similar problem plagued the same computer when Atlantis delivered the European Columbus laboratory to the station in early 2008. The shuttle can operate with only a single computer running. But the loss of three of the five GPCs would prompt a return to Earth at the earliest opportunity. The computer recovery work was performed as Atlantis mission specialist Sandra Magnus and pilot Doug Hurley used the station's robot arm to hoist the Raffaello cargo carrier out of the shuttle's payload bay and then berthed it to the Earth-facing side of the U.S. Harmony module. Sixteen motor-driven bolts were activated on the port's common berthing mechanism to latch the Raffaello module firmly in place. A series of leak checks will be carried out to ensure a tight seal. The module is to be activated and opened later today. Shuttle mission commander Chris Ferguson and his crew, which also includes mission specialist Rex Walheim, will spend the next week unpacking the Raffaello module, which holds a year's worth of food and supplies. More than 5,600 pounds of surplus station gear and trash will be packed back into the module for a return to Earth. Web posted. (2011). [Failed Shuttle Atlantis Computer Recovered [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, July 11].]

**Quilt made of mission patches holds memories of shuttle launches**

Shortly after Vicky Turner began working on the shuttle program in 1979, she started tossing mission patches into a shoebox. A few years ago, she realized the box didn't do justice to the three decades of memories. So Turner decided to create a quilt -- her first one ever -- of all the patches. It took two years to assemble the seven-foot by eight-foot piece of artwork, which is nearly complete. "It's bittersweet," said Turner, who provides computer support for ground processing at United Space Alliance. "It's nice to see the quilt coming to a finish. It's sad to see the program coming to an end." She's hoping her quilt will be displayed for a time at a museum or the Kennedy Space Center Visitor Complex. For now, fellow shuttle workers line up for photos with the masterpiece. Every patch is displayed on a sky blue square and framed with a royal blue backing. Each orbiter also is present. Challenger and Columbia surrounded each by seven stars, one for every astronaut lost with the vehicles. Web posted. (2011). [Quilt made of mission patches holds 3 decades of memories of shuttle launches [Online]. Available WWW: http://www.floridatoday.com/ [2011, July 11].]

**Debris poses no danger to station, shuttle, NASA says**

The International Space Station and space shuttle Atlantis are not in danger from an orbiting piece of debris after all, NASA said Monday. The agency had been tracking a piece of the COSMOS 375 satellite, saying it could come close to the station and the shuttle docked there on Tuesday. But the agency said Monday that Mission Control verified that the debris will pass a safe distance from the station and shuttle. The scrap is one of more than 500,000 pieces of debris tracked in Earth's orbit, according to NASA. A space-debris incident nearly two weeks ago prompted the crew of the International Space Station to take shelter inside two Soyuz capsules when the debris came within 1,100 feet of the station. Atlantis docked with the International Space Station on Sunday for a week-long rendezvous, two days after blasting off on a historic flight marking the final liftoff of the U.S. shuttle program. Web posted. (2011). [Debris poses no danger to station, shuttle, NASA says [Online]. Available WWW: http://www.cnn.com/ [2011, July 11].]

**July 12:** **Next GPS satellite launch now targeted for Friday**

The Delta 4 rocket launch carrying the next Global Positioning System satellite into orbit from Cape Canaveral has been delayed by 24 hours. Originally planned for liftoff Thursday, the mission has been postponed to Friday morning at 2:45 a.m. EDT (0645 GMT). A reason for the rescheduling was not immediately announced. Weather forecasters are predicting a 70 percent chance of acceptable conditions for the predawn blastoff. The chance of lingering cloud cover from evening thunderstorms will pose the main concern during the launch window. The outlook calls for scattered low, mid and high clouds, isolated showers or thunderstorms in the area, southwesterly winds of 8 to 12 knots and a temperature of 78 degrees F. The 20-story rocket will haul the GPS 2F-2 spacecraft directly into the navigation network to replace an aging bird for providing highly precise location and timing information for military and civilian users around the globe. Web posted. (2011). [Next GPS satellite launch now targeted for Friday [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, July 12].]

**Rocket decision still weeks away, NASA chief says**

NASA Administrator Charlie Bolden told Congress on Tuesday that it could be weeks — or longer — before the agency unveils the design for its next big rocket, a timeline that prompted lawmakers to threaten an investigation into the delay. "We have waited for answers that have not come. We have pleaded for answers that have not come," said U.S. Rep. Ralph Hall, the Texas Republican who chairs the House science committee. "We have run out of patience." Hall then threatened to join a Senate inquiry into NASA's delay in releasing information about the new rocket. The uptick in congressional pressure comes as emotions are running high with the retirement of the space shuttle and uncertainty about plans to replace it. Until last year, NASA planned to transition into a program that would return astronauts to the moon, but Congress and the White House cancelled the troubled Constellation project last fall after years of technical and financial problems. Instead, lawmakers directed NASA to build a new rocket and crew capsule from pieces of the shuttle and Constellation programs and have a plan in place by last January. More than six months later, NASA has yet to deliver that plan on the so-called Space Launch System and won't have a decision until late summer at the earliest. "While I would hope to have a final decision to announce this summer, the absolute need to make sure our SLS program fits within our overall budget constraints suggests it could take longer," Bolden said. "We cannot rush a critical decision that will drive NASA's activities for several decades." Cost has been a major issue for the new program ever since its inception. In January, NASA told Congress that it could not build a new rocket and capsule by the Dec. 31, 2016, deadline it had been given. Bolden on Tuesday echoed those concerns and laid out a timeline that would have "crewed missions by the early 2020s and a visit to an asteroid in 2025." As it stands, Bolden and top NASA officials already have settled on a vehicle design — essentially an Apollo-like crew capsule atop the shuttle's external tank, with two strap-on boosters on either side. But Bolden said NASA is waiting on cost estimates to ensure it is affordable. Web posted. (2011). [Rocket decision still weeks away, NASA chief says [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, July 12].]

**Melbourne High grad hopes comedy helps ease sting of shuttle shutdown**

It's painful for Lear Bunda to watch the effect the ending of the shuttle program is having on the area he grew up in and loves so much. So the 28-year-old Melbourne High graduate wants to use his talents as a film and television writer, director and editor to help his hometown. Bunda is the writer and director for the movie "The Space Coast," a teen comedy about a recent high school graduate who dreams of becoming an astronaut despite numerous obstacles. Although Bunda now lives in Atlanta where he works as an editor for the Cartoon Network, his 90-minute film will be shot during the next several months in Brevard County. "I feel like people are going to be wanting more (of the shuttle program), and there just isn't going to be any and it's kind of sad," he said. "I feel like we're making another mission to keep the program living on." He's hoping to have the film finished by February in time for screenings at various film festivals. Web posted. (2011). [Melbourne High grad hopes comedy helps ease sting of shuttle shutdown [Online]. Available WWW: http://www.floridatoday.com/ [2011, July 12].]

**Coast Guard veteran worked every shuttle liftoff**

The end of shuttle launches will mean the end of a long stint for James Smith helping to keep boaters out of the security zone. "I've worked every one of them," Smith said. "It's something I've wanted to do, being a part of it all these years." Smith, who spent 28 years in the Coast Guard Reserve and is now in the Coast Guard Auxiliary, has been involved from the beginning: the April 12, 1981, launch of shuttle Columbia. He's known around Coast Guard Station Port Canaveral as "Grumpy," a nickname that arose after Smith got hurt on his civilian job, and his crewmates teased him when he complained about the pain. In the early days of shuttle launches, Smith helped cook for the crews out on the boats and later made sure they had all the supplies they needed. The crews also kept boaters out of the designated safety zone before the launches. For three days leading up to the launch, crews maintain the security zone, an area 23 miles long stretching three miles off the coast. They pause for a moment at the start of the countdown to watch the launch from wherever they are. This one was no different. Web posted. (2011). [Coast Guard veteran worked every shuttle liftoff [Online]. Available WWW: http://www.floridatoday.com/ [2011, July 12].]

**July 13: S.RES.233 -- Honoring the men and women of the National Aeronautics and Space Administration Space Shuttle Program on reaching the historic milestone of the 135th and final flight of the Space Transportation... (Agreed to Senate - ATS)**

SRES 233 ATS

112th CONGRESS

1st Session

**S. RES. 233**

Honoring the men and women of the National Aeronautics and Space Administration Space Shuttle Program on reaching the historic milestone of the 135th and final flight of the Space Transportation System.

**IN THE SENATE OF THE UNITED STATES**

## July 13, 2011

Mr. NELSON of Florida (for himself, Mr. BROWN of Ohio, Mrs. HUTCHISON, Mr. BOOZMAN, Mr. ROCKEFELLER, Ms. MIKULSKI, Mr. RUBIO, Mr. UDALL of Colorado, Mr. WARNER, and Mr. VITTER) submitted the following resolution; which was considered and agreed to

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**RESOLUTION**

Honoring the men and women of the National Aeronautics and Space Administration Space Shuttle Program on reaching the historic milestone of the 135th and final flight of the Space Transportation System.

Whereas the launch of the space shuttle Atlantis on July 8, 2011, is the 135th and final flight of the National Aeronautics and Space Administration Space Transportation System (STS-135) and the 33rd flight of the space shuttle Atlantis;

Whereas the National Aeronautics and Space Administration built 5 space-capable orbiters, the Columbia, the Challenger, the Discovery, the Atlantis, and the Endeavour;

Whereas, with the launch of STS-135, 355 individuals will have flown 852 times during the history of the Space Shuttle Program, beginning with the launch of the first Space Transportation System flight on April 12, 1981;

Whereas a spirit of international partnership has been fostered among the 16 countries represented on the space shuttle missions flown during the history of the Space Shuttle Program, including Belgium, Canada, France, Germany, Israel, Italy, Japan, Mexico, the Netherlands, Russia, Saudi Arabia, Spain, Sweden, Switzerland, Ukraine, and the United States;

Whereas the space shuttles together have flown 537,114,016 miles, with STS-135 adding an additional 4,000,000 miles;

Whereas, during the history of the Space Shuttle Program, more than 2,000 on-orbit experiments have been conducted in the fields of Earth science, biology, fluids, materials sciences, and astronomy;

Whereas the Space Shuttle Program has executed the launch and service of the Hubble Space Telescope, enabling groundbreaking and breathtaking views of the universe outside of our solar system;

Whereas the space shuttles have docked to 2 different space stations, with 9 missions to Mir, the space station of the Government of Russia, and 37 missions to the International Space Station;

Whereas the Space Shuttle Program has been essential to the on-orbit assembly of the International Space Station and vital to ensuring the continued viability and support of the International Space Station;

Whereas the space shuttles have landed at the Kennedy Space Center 77 times, at Edwards Air Force Base 54 times, and at the White Sands Test Facility once;

Whereas the launch configuration of the entire Space Transportation System contains approximately 2,500,000 moving parts and, at lift-off, weighs approximately 4,500,000 pounds; and

Whereas the space shuttles can travel around the Earth at a speed of approximately 17,500 miles per hour: Now, therefore, be it

*Resolved,* That the Senate--

(1) congratulates the National Aeronautics and Space Administration on reaching the historic milestone of the 135th and final flight of the Space Transportation System;

(2) honors the men and women of the Space Shuttle Program, who worked tirelessly to design, build, and operate the Space Transportation System, in order to promote science, exploration, and international cooperation;

(3) remembers the 14 crewmembers lost during the space shuttle Challenger accident, which occurred on January 28, 1986, and the space shuttle Columbia accident, which occurred on February 1, 2003;

(4) notes the diligence in applying the lessons learned through the Challenger and Columbia tragedies to honor the 14 crewmembers we lost and enhance the safety of the crewmembers that followed;

(5) recognizes that the Space Shuttle Program has inspired generations of children to become engineers, scientists, and explorers, which has led to maintaining the precedent of leadership in human space exploration set by the United States during the Mercury, Gemini, and Apollo missions; and

(6) acknowledges that the Space Shuttle Program has, through its technological advancements and scientific research, driven innovation in the fields of science, technology, engineering, and mathematics to benefit the people of the United States and all of humankind.

Web posted. (2011). [-- Honoring the men and women of the National Aeronautics and Space Administration Space Shuttle Program on reaching the historic milestone of the 135th and final flight of the Space Transportation... [Online]. Available WWW: http://thomas.loc.gov/ [2011, July 13].]

**165 years after discovery, Neptune completes first orbit**

In no celestial hurry, Neptune has just completed its first orbit around the sun since being discovered 165 years ago by Earthlings. In 1989, the unmanned Voyager 2 spacecraft snapped a relative close-up of the giant, cold ball of hydrogen and helium. Web posted. (2011). [165 years after discovery, Neptune completes first orbit [Online]. Available WWW: http://www.floridatoday.com/ [2011, July 13].]

**Elton John gives Atlantis astronauts best wishes**

The astronauts making NASA's last space shuttle flight received best wishes Wednesday from the original "Rocket Man," Elton John. NASA beamed up a prerecorded message by the British superstar, as well as a half-minute of his Apollo-era 1972 song, which was inspired by space exploration. Web posted. (2011). [Elton John gives Atlantis astronauts best wishes [Online]. Available WWW: http://www.usatoday.com/ [2011, July 13].]

**Couple adds to ULA's record**

Together, United Launch Alliance engineers Christina and Rodney Davignon have played key roles in the scheduled predawn launch Thursday of the GPS IIF satellite, which will orbit the Earth 22,000 miles up sending a signal that could help lost drivers find the shortest route home and guide smart bombs to kill terrorists. The couple is proud of their contributions to the nation's defense and to the economy. The GPS industry supports an estimated 3.3 million U.S. jobs and has an almost $100 billion economic effect. He works at the pad, and she often works in the payload processing area. He's on a console on launch day, and she's usually working on the next launch by then. The Davignons are among eight married couples who work for ULA, which has 671 employees at Cape Canaveral Air Force Station. ULA has had 20

years of 100 percent mission success. Web posted. (2011). [Couple adds to ULA's record [Online]. Available WWW: http://www.floridatoday.com/ [2011, July 13].]

**Space Florida nonprofit scores space station deal**

A Kennedy Space Center-based nonprofit will take over management of the portion of the International Space Station designated as a national laboratory, NASA announced Wednesday. The decision is a significant victory in local efforts to diversify the area's space operations beyond launching rockets as the shuttle program nears its end. The $15 million organization won't employ many people but establishes the Space Coast as a gateway for space-based research that could attract additional resources. Space Florida, the state's aerospace economic development agency, created the nonprofit Center for the Advancement of Science in Space, or CASIS, and led a partnership that submitted a proposal to NASA.The organization will be in the Space Life Sciences Lab, a KSC facility opened in 2003 with $30 million in state funding. The lab is the anchor tenant of a planned research and technology complex called Exploration Park. A formal contract award won't be made until later this summer after NASA and the new center negotiate terms. NASA would not say how many proposals were submitted, or identify Space Florida's partners in the initiative. The station was designated a national lab in 2005, but research -- and particularly non-NASA research -- so far has taken a back seat to assembly and maintenance. That's supposed to change now that construction is complete and the station's operating life has been extended from 2015 to at least 2020. NASA will maintain control of experiments focused on its exploration goals, such as the effects of long-duration spaceflight or materials for new spacecraft. But lab facilities used to test materials, grow plants and study vaccines in microgravity will be made available to companies, universities and other government agencies for their own purposes. The goal, NASA officials have said, is to generate a return for taxpayers on their investment in the $100 billion outpost. It will be the new center's job to solicit, select and execute non-NASA research proposals. A board of directors will be established with experts in various fields to assist in the selection. The center will likely employ 15 to 25 people full-time and begin its work in the 2012 fiscal year that starts Oct. 1, funded with up to $15 million. The new nonprofit adds to other developments that promise to broaden KSC's traditional role, though they won't employ as many people as the shuttle program did. A new KSC-based office will manage the development and flights of private space taxis NASA hopes will be ready to fly astronauts to the space station by 2015 or 2016. Final assembly and checkout of the Orion capsule being built for deep space exploration missions also will be performed at KSC. Web posted. (2011). [Space Florida nonprofit scores space station deal [Online]. Available WWW: http://www.floridatoday.com/ [2011, July 14].]

**Stripped-down Discovery towed into VAB**

Shuttle Discovery was towed back into Kennedy Space Center's Vehicle Assembly Building on Wednesday, looking nothing like it did when it was getting ready for a flight. For starters, Discovery was towed on its wheels, not a transporter. It had no main engines or orbital maneuvering engines or thrusters. Those are being decommissioned in New Mexico. NASA is moving Discovery into temporary storage in High Bay 4 for about a month, opening up a processing hangar for Atlantis upon its planned July 21 return from the final shuttle mission. Later, Discovery and Endeavour will swap places. Discovery's former hangar, Orbiter Processing Facility-3, is being prepared for non-shuttle use. Discovery, meanwhile, is being readied for museum display at the Smithsonian Institution, where it is scheduled to be ferried in April. By the time it gets there, it will look much like it did after rolling to a stop on its final flight -- few would notice that its main engines will be replicas, the windows will be spares and some pieces of internal plumbing will be gone. Web posted. (2011). [Stripped-down Discovery towed into VAB [Online]. Available WWW: http://www.floridatoday.com/ [2011, July 14].]

**July 15: NASA Commercial Crew Program Forum**

The National Aeronautics and Space Administration (NASA) will present a status of the Commercial Crew Program strategy on Wednesday, July 20, 2011. The Forum will be held at the Press Site at Kennedy Space Center from 11:00 a.m. to 12:00 p.m. The Program Forum's key topics will include: *

Background of NASA's Commercial Crew Strategy; * Key Program Attributes; * Potential Commercial Crew Program Strategy; * Short Q&A session. The agenda consists of a 30-minute presentation followed by a 30-minute Question and Answer period. Web posted. (2011). [NASA Commercial Crew Program Forum [Online]. Available WWW: http://www.spaceref.com/ [2011, July 15].]

**Delta IV launch scrubbed until Saturday**

The planned overnight launch of a Delta IV rocket was scrubbed for the second time. This time: weather is to blame. The launch of the GPS payload was reset for early Saturday. The 19-minute launch window will open at 2:41 a.m. Saturday. The forecast calls for a 70 percent chance of favorable weather. United Launch Alliance said bad weather prevented the launch team from rolling the Mobile Service Tower away from the vehicle tonight. The rocket is carrying a GPS payload for the Air Force. Originally, launch had been scheduled for Thursday but was delayed 24 hours to deal with a technical issue. Web posted. (2011). [Delta IV launch scrubbed until Saturday [Online]. Available WWW: http://www.floridatoday.com/ [2011, July 15].]

**Boeing, KSC in talks about space taxi site**

The Boeing Co. is in negotiations with NASA and Space Florida to build a commercial space taxi in a former shuttle hangar at Kennedy Space Center. If it pans out, the deal would bring hundreds of jobs to KSC starting in the next 12 to 18 months, when the center's employment will be at its lowest level since the end of the Apollo program. John Elbon, the manager overseeing development of Boeing's CST-100 spacecraft, said Space Florida and KSC were still working out which facilities would be made available, including the hangar that formerly housed the orbiter Discovery. Boeing is one of four companies that shared in a $270 million award from NASA this year to accelerate development of vehicles that could transport astronauts to the International Space Station by the middle of the decade. With the retirement of the shuttle fleet, Russian Soyuz spacecraft will provide the only access to the station until those vehicles are ready. Boeing wants to locate its manufacturing, engineering, integration and flight teams in the same place to increase cost-saving synergies, Elbon said, and is exploring options in multiple states. The work would require a high bay facility for manufacturing, test facilities and office space, and Discovery's hangar and an adjacent shop have been discussed as a possible fit. The company plans to announce within weeks which rocket will launch the CST-100 spacecraft, but all the candidates would launch from Cape Canaveral Air Force Station or KSC. Aside from the facilities under consideration, proximity to the launch site and the availability of experienced former shuttle workers would be advantages in KSC's favor. A Space Florida spokeswoman acknowledged the discussions with Boeing to potentially use a shuttle hangar but said there was no formal agreement yet with KSC. KSC Director Bob Cabana and NASA Administrator Charlie Bolden in recent weeks have reported strong commercial interest in some shuttle facilities and hinted at "major announcements" soon that might boost hopes about Kennedy's post-shuttle future. Web posted. (2011). [Boeing, KSC in talks about space taxi site [Online]. Available WWW: http://www.floridatoday.com/ [2011, July 15].]

**July 16: GPS navigation satellite takes nighttime ride to orbit**

Continuing a prolific partnership that has benefited billions of users around the world, the Delta rocket family today successfully launched its 50th satellite for the Global Positioning System. The powerful Delta 4 booster blasted away from Cape Canaveral's Complex 37 at 2:41 a.m. EDT (0641 GMT) for a middle-of-the-night ascent precisely timed to deliver a critical replacement satellite directly into the GPS constellation. It was the type of rocket flight that could appear routine. But replenishing the navigation network is vital to the military forces, civilian consumers and the blossoming commercial marketplace that have come to depend on GPS every day. Known as the GPS 2F-2 satellite, this newest bird will take the place of the GPS 2A-11 spacecraft that just celebrated its 20th birthday in orbit, exceeding the wildest expectations for longevity. That old craft was deployed by a Delta 2 rocket from Cape Canaveral on July 3, 1991, during the heydays of launching GPS satellites at a fast and furious rate. The next GPS launch is

tentatively targeted for September 2012. Web posted. (2011). [GPS navigation satellite takes nighttime ride to orbit [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, July 16].]

**July 17: Station restocking completed by shuttle Atlantis crew**

The Atlantis astronauts put in a final day of logistics transfer work Sunday, working through off-duty time to finish moving a last few items into the Raffaello multi-purpose logistics module for return to Earth. If all goes well, the cargo module will be detached from the station's forward Harmony module and mounted back in the shuttle's payload bay early Monday, setting the stage for the ship's final departure from the lab complex Tuesday morning. Web posted. (2011). [Station restocking completed by shuttle Atlantis crew [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, July 17].]

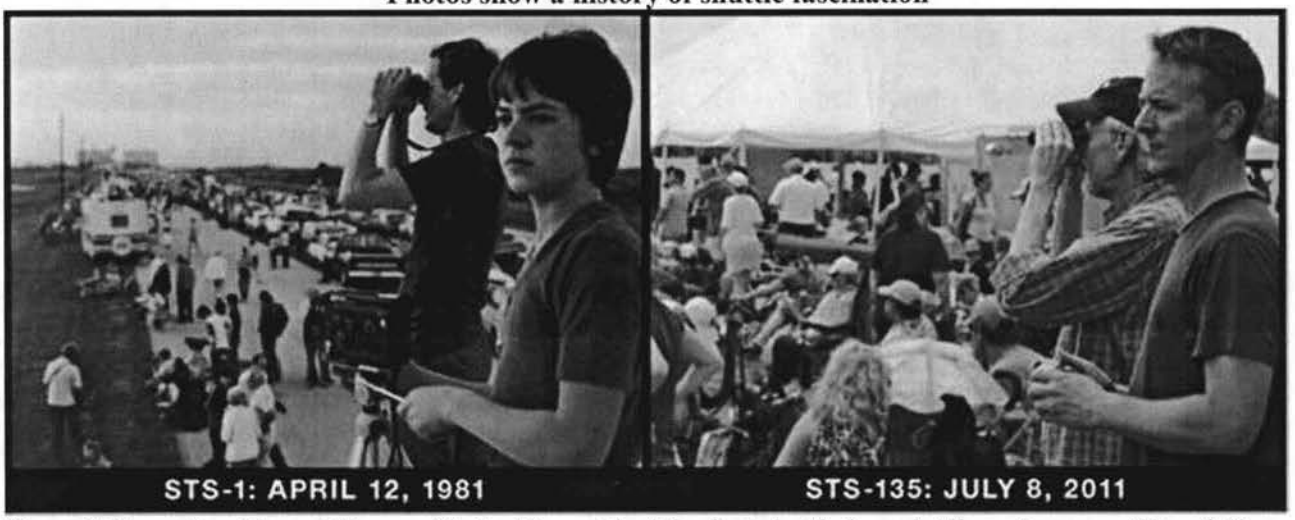
**July 18: NASA Transitions To Commercial Space**

Wheel stop for STS-135 (Atlantis) on Thursday will mark the end of the space shuttle program and NASA and its Kennedy Space Center (KSC) are accelerating their transition to the new era of commercial space. The day before the launch of STS-135, KSC signed a Space Act agreement with Sierra Nevada, which is developing the Dream Chaser spaceplane. The agreement will allow KSC to work with Sierra Nevada to define and execute launch preparations and post-landing activities for Dream Chaser. Today, three days prior to STS-135's landing, an unfunded Space Act agreement was signed between NASA and the United Launch Alliance (ULA). ULA is a Boeing-Lockheed Martin joint venture that builds and launches the Delta IV and Atlas V families of launch vehicles. The agreement will pave the way for consideration of using the Atlas V as a launch vehicle for future crew spacecraft. Right now, SpaceX and Orbital Sciences Corp. are developing new launch vehicles (Falcon 9 and Taurus II) to launch cargo and crews to the International Space Station (ISS) as part of the commercial crew program. Some argue that the Atlas V and Delta IV, which already exist and are used to launch spacecraft for critical national security space missions, could be upgraded for human spaceflight, too. Web posted. (2011). [NASA Transitions To Commercial Space [Online]. Available WWW: http://www.spacepolicyonline.com/ [2011, July 18].]

**Transformers boosting KSC Visitor Complex business**

Teenage brothers Timmy and Alex Bird of Manchester, England, were among the enthusiastic fans who left the IMAX theater at the Kennedy Space Center Visitor Complex raving about the new "Transformers" movie. "It's a lot better than seeing it on a normal cinema -- a lot better experience," said Alex Bird, 14. The action on the screen "really comes out to you. "Another "Transformers" viewer at the visitor complex, Nadiya Nabibaks of Rotterdam, the Netherlands, said the Imax 3D format made her feel "almost like you're in the movie" itself. The Michael Bay blockbuster, "Transformers: Dark of the Moon" has drawn strong crowds to the visitor complex since opening there last month, helping the attraction stay on track to reach projections of a 10 percent to 15 percent boost in attendance this summer, officials there say. "We're tracking well with the movie," said John Stine, sales and marking director at the visitor complex, which does not disclose attendance figures, other than to say about 1.5 million people a year come there, making it Brevard County's most popular paid tourist attraction. "We're very pleased with attendance." Bay shot some scenes of his latest of his three "Transformers" films at KSC and Cape Canaveral Air Force Station, using local residents connected with space and military programs as acting extras. Other films replaced "Transformers" at IMAX screens elsewhere in the country this weekend. So the visitor complex now is one of only three places in the eastern half of the United States where viewers can see "Transformers" on an Imax screen, the others being Indianapolis and Myrtle Beach, S.C., Stine said. It is scheduled to play at the visitor complex through Sept. 5. On the days before and after the July 8 launch of shuttle Atlantis, the visitor complex hosted actor Peter Cullen, the voice of Autobots leader Optimus Prime, for a series of events for complex guests at the theater and at the Rocket Garden. These included an event for children called "Design Your Own NASA Transformer with Peter Cullen." Web posted. (2011). [NASA Transitions To Commercial Space [Online]. Available WWW: http://www.floridatoday.com/ [2011, July 18].]

**Photos show a history of shuttle fascination**




*Kenneth Bray, then 39, and his son, Chris, 13, watched the first shuttle launch. The pair -- now 69 and 43 -- came back to witness Atlantis blast off July 8 on the final mission of the shuttles / For FLORIDA TODAY*

In 1981, a 13-year-old boy and his 39-year-old father traveled from New York to Brevard County to watch the first shuttle launch from NASA Causeway. A snapshot taken before the launch captures the moment -- Dad looking through binoculars, son holding a camera and staring off in another direction. Fast forward 30 years to the final shuttle launch. Chris Bray, now 43, and his dad, Kenneth Bray, now 69, traveled back to the Space Coast to be part of history, watching as Atlantis lifted off the launch pad on July 8. This time, they were at the Astronaut Hall of Fame. The pair decided to re-create that treasured photo. Web posted. (2011). [Photos show a history of shuttle fascination [Online]. Available WWW: http://www.floridatoday.com/ [2011, July 18].]

**NASA agrees to help modify Atlas 5 rocket for astronauts**

United Launch Alliance and NASA will share technical data to help ready the company's Atlas 5 rocket for astronaut passengers, officials announced Monday. The agreement places the Atlas 5 rocket among the top competitors to launch the next piloted spacecraft from U.S. soil after the retirement of the space shuttle. Colorado-based United Launch Alliance was passed over in NASA's last Commercial Crew Development, or CCDev, competition. When the agency announced the winners in April, officials said they gave priority to spacecraft developers because rockets would take less time to modify for manned flights. NASA divided $270 million among four companies in the April announcement, giving $92.3 million to Boeing, $80 million to Sierra Nevada Corp., $75 million to SpaceX and $22 million to Blue Origin. The competition was the second round of NASA's CCDev program, which provides federal funding to U.S. space companies building commercial human-rated spacecraft. All of the winners are designing spacecraft to carry astronauts to and from low Earth orbit destinations such as the International Space Station. But the space vehicles will need rockets to send them into orbit. Boeing, Sierra Nevada and Blue Origin could launch their spacecraft on ULA rockets. Sierra Nevada and Blue Origin have selected the Atlas 5 rocket to launch their spaceships. Sierra Nevada is working on a lifting body space plane named the Dream Chaser and Blue Origin, headed by Amazon.com founder Jeff Bezos, is developing a biconic capsule called the New Shepard. Boeing's CST-100 spaceship is designed to ferry up to seven astronauts to and from orbit. The company says the craft is compatible to launch on several rockets, including the Atlas 5, but managers plan to select a primary launch vehicle in the coming weeks, according to a Boeing spokesperson. Boasting a stellar success record, the Atlas 5 rocket has launched 26 times with U.S. military payloads, NASA science probes and commercial communications satellites. The

Atlas 5's first stage is powered by a kerosene-fueled Russian RD-180 main engine, and its Centaur second stage features one or two RL10 engines burning cryogenic propellant. SpaceX will launch its Dragon capsule on the company's own Falcon 9 rocket. NASA's agreement with ULA doesn't provide any funding, but it facilitates data sharing among the two entities. Under the agreement, ULA will provide technical data on the Atlas 5 rocket to NASA, which will give input based on the agency's extensive human spaceflight experience. The space agency will also share draft human-rating certification requirements for ULA to review and provide feedback. Web posted. (2011). [NASA agrees to help modify Atlas 5 rocket for astronauts [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, July 19].]

**July 19: Shuttle flexes robotic arm for last time**

Nearly 30 years after its debut, the space shuttle's 50-foot, Canadian-built robotic arm is beginning its last operation in space. Atlantis astronauts will drive the Shuttle Remote Manipulator System, known as the Canadarm, to perform a final inspection of critical heat shields. Attached to the end of the arm is a 50-foot boom extension equipped with cameras and lasers that will scan reinforced carbon-carbon panels lining the orbiter's wing leading edges and nose cap, areas subjected to the most intense heat during re-entry. Analysts on the ground will review the images for any sign that micrometeroids or orbital debris have dinged the heat shields since an identical inspection was performed July 9, the day after Atlantis launched the 135th and final shuttle mission. Mission managers so far have identified no concerns about heat shield damage. The Flight Day 2 and "late" inspections are standard procedures implemented after the 2003 Columbia disaster. The Canadarm was first used by Columbia pilot Dick Truly on the second shuttle mission in November 1981. Since then arms have been used to grab and deploy satellites including the Hubble Space Telescope, and helped move and install much of the large, heavy hardware that was joined to form the International Space Station. Web posted. (2011). [Shuttle flexes robotic arm for last time [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, July 19].]

**Early forecast good for Thursday landing**

Less than two days before the final shuttle landing at Kennedy Space Center, planned at 5:56 a.m. EDT Thursday, preliminary forecasts show no issues that would delay an on-time touchdown. The latest report from the Spaceflight Meteorology Group at Johnson Space Center shows scattered clouds and light winds with no violations of landing rules. "We're looking forward to a good entry and landing on Thursday if weather holds out for us," NASA's Kwatsi Alibaruho said today during his final status update as a shuttle flight director. Additional detail on landing plans is expected during a 1 p.m. briefing led by LeRoy Cain, the deputy shuttle program manager and head of the Mission Management Team, and Mike Suffredini, the International Space Station program manager. With Atlantis returning in darkness after 200 orbits, it's likely the only opportunity for most on the Space Coast to see the final shuttle landing will come on TV. If necessary, Atlantis could attempt a landing one orbit later for a 7:32 a.m. Thursday touchdown, or stay aloft until Friday. Web posted. (2011). [Early forecast good for Thursday landing [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, July 19].]

**Cocoa Beach Brewing Company**

Our latest batch of Von Braun Ale is just about ready and will be on tap Thursday to help us celebrate the final return of Space Shuttle Atlantis! Web posted. (2011). [Cocoa Beach Brewing Company [Online]. Available WWW: http://www.facebook.com/ [2011, July 19].]

**July 20: Official Overarching Messages Regarding Shuttle Retirement**

From: Coats, Michael {Jsc-Center-Director}(JSC-AA111); Sent: Wednesday, July 20, 2011 11:31 AM; To: JSC-DL-JSC-Civil-Servants; JSC-DL-JSC-Contractors; Subject: FW: Overarching Messages / End of the Space Shuttle Program: A Legacy to Build On / * We salute the thousands of men and women who have made the shuttle program a success both on the ground and in space. Their legacy is historic, and we

will build on it as we develop the next transportation systems to support the human exploration of space. * We are not ending human space flight, we are recommitting ourselves to it and taking the necessary - and difficult - steps today to ensure America's pre-eminence in human spaceflight for years to come. / Support for the Florida Space Coast / * Florida is critical to the continued success of the U.S. space program, and the Obama Administration is making smart investments in the State's future. * The Bush Administration in 2004 made the decision to end the Space Shuttle program. President Obama extended the program's life by adding two Space Shuttle launches to the manifest. * NASA has established the Commercial Crew Program Office at the Kennedy Space Center to manage the commercial space activities that will be critical to the nation's future space flight. * The President's fiscal year 2012 budget recommends a nearly $2 billion investment in the programs at the Kennedy Space Center (KSC), including a launch Infrastructure and modernization program, and $5 million for the Federal Aviation Administration's Commercial Spaceflight Technical Center. * The Administration has approved $15 million for Brevard county workforce assistance through a National Emergency Grant. Half of these funds have been received and the remainder is expected sometime between FY11 and FY12. Web posted. (2011). [NASA Internal Memo: Official Overarching Messages Regarding Shuttle Retirement [Online]. Available WWW: http://www.spaceref.com/ [2011, July 20.]

**Merritt Island High team may launch satellite**

After working with NASA engineering mentors last school year, Merritt Island High students were selected as the second high school group in the nation to build and potentially launch a small satellite, called a CubeSat, from a NASA rocket. The activity is an extra-curricular activity for the students, whose numbers vary from eight to a dozen. Teachers Alison Fetig and Julie White and Kennedy Space Center mentors worked with the students to meet requirements and pass the first of several reviews. The students designed their satellite, which they named StangSat, to communicate with a university satellite about launch data. After an initial interview in April, NASA and industry officials commented that the Merritt Island High students were well prepared and further ahead than their freshmen and sophomore college counterparts. Students currently involved are Danielle George, Erin McCaskey, Josh Zirkle, Tyler Johnson, Vincent Dewan, Tony Calderin, Gurkirat Kainth, Alyssa Marcoux, Andrew Satorski and Mike Glowaczewski. The lead mentors are Rene Formoso and Shaun Daly from LSP Management, but other engineers also volunteer with the students, she said. "This is a significant undertaking for these students to work on a project of this magnitude at the high school level," said Merritt Island High Principal Gary Shiffrin. The students and their mentors are continuing to work on the project over the summer and, with financial support from LSP, plan to attend a CubeSat workshop Aug. 5-6 and a small satellite conference Aug. 7-10 at Utah State University in Logan. Web posted. (2011). [Merritt Island High team may launch satellite [Online]. Available WWW: http://www.floridatoday.com/ [2011, July 20.]

**July 21: 'Mission complete, Houston': Space shuttle program is history**

Atlantis and America's final four shuttle astronauts swept out of a dark sky for an emotional homecoming at Kennedy Space Center on Thursday, capping 30 years of triumphant, and sometimes tragic, space adventures. The International Space Station -- perhaps the greatest legacy left by the shuttle -- flew overhead as homebound Atlantis soared over the west coast of Florida. Then for the final time, trademark twin sonic booms rattled the Space Coast, shaking the foundations of family homes and businesses whose fortunes have followed the exhilarating highs and devastating lows of NASA's shuttle program. Touchdown came at 5:57 a.m. Forty-one minutes before the dawn of a new day, Atlantis rolled to a halt on Runway 15. "Mission complete, Houston. After serving the world for over 30 years, the space shuttle's earned its place in history, and it's come to a final stop," Atlantis commander Chris Ferguson said. The historic moment was sad for shuttle workers, including 1,510 people being laid off today. "Hard to describe the emotions. There were good emotions in that we brought the crew home safely, and the mission's complete. Certainly sadness that it's over, and people will be moving on. You hate to see them leave. But that's a reality," said NASA Shuttle Launch Director Mike Leinbach. "I saw grown men and grown women crying -- tears of joy to be sure. Human emotions came out on the runway, and you

couldn't suppress them." Five-and-a-half hours later, hundreds of workers endured stifling heat, many waving American flags, many waving fans, to watch Atlantis roll back to its processing hangar. Senior NASA officials strived to keep the mood light, and celebratory. But even "The Final Four" astronauts acknowledged a somber situation. NASA through at least 2020 will continue flying astronauts to and from the International Space Station. For the next several years, the astronauts will fly aboard Russian spacecraft. Meanwhile, NASA is investing money in the development of commercial space taxis that will be built and operated by U.S. aerospace companies. The idea is to reduce or eliminate reliance on Russia while freeing up NASA to develop a super-sized rocket, and the Apollo-style Orion capsule, for missions beyond Earth orbit. The goal ultimately is to explore the inner solar system. Target destinations include asteroids, the moon, Mars and the Martian moons Phobos and Deimos. Emotions also were close to the surface at Johnson Space Center in Houston, where hundreds of workers gathered to watch history unfold 900 miles away. NASA Entry Flight Director Tony Ceccacci said the motto in Mission Control is "flight controllers don't cry." He tried to remain stoic -- like a steely eyed missile man -- after his team guided Atlantis and its crew through an era-ending atmospheric re-entry. "This will be the last time this team will be together," Ceccacci said, struggling to maintain his composure. The Atlantis touchdown brought to a close the nation's 135th and final shuttle flight, a 5.3-million-mile mission to deliver a year's worth of supplies to the International Space Station. During those flights, NASA's five shuttle orbiters carried 355 individuals from 16 nations. Counting frequent fliers, 852 seats ultimately were filled on shuttle missions. The fleet enabled the first woman and first African-American, schoolteachers, congressional legislators and even a Saudi prince to fly into space. NASA's last shuttle mission was the 33rd flight of Atlantis, a spaceship that traveled 125,935,769 miles during 307 days in orbit. Atlantis flew 12 missions to the International Space Station, seven to Russia's space station Mir and the fifth and final flight to the Hubble Space Telescope. The winged orbiter launched on five flights for the Department of Defense, four of which were classified top secret. Atlantis deployed the Galileo spacecraft on its journey to Jupiter, the Magellan radar mapper on its voyage to Venus and the $600 million Compton Gamma Ray Observatory. Grandstands flanking the three-mile shuttle runway were crowded with about 2,000 NASA and contractor workers, visiting VIPs and the families of Ferguson, pilot Doug Hurley, and mission specialists Sandra Magnus and Rex Walheim. A big contingent of senior NASA managers and administrators greeted the crew on the runway along with technicians wearing matching "Loud-and-Proud" Hawaiian shirts -- wardrobe staples at KSC since the shuttle's return to flight after the 1986 Challenger accident. Mission accomplished. Web posted. (2011). ['Mission complete, Houston': Space shuttle program is history [Online]. Available WWW: http://www.floridatoday.com/ [2011, July 21.]

**Space shuttle: A legacy to behold**

With Atlantis back home at the Kennedy Space Center, work begins to prepare the orbiter for its starring role as the centerpiece of a massive new exhibit at the adjacent visitor complex. The $100 million project will be the KSC Visitor Complex's most ambitious ever; it's due to open by the summer of 2013. "The shuttle program is going to live on in a vibrant way," said Bill Moore, the complex's chief operating officer. "We are really honored to be chosen by NASA to display Atlantis." Nearly two dozen museums and other attractions competed to display one of the three surviving orbiters. The Smithsonian Institution's National Air and Space Museum Steven F. Udvar-Hazy Center in Chantilly, Va., was picked to display Discovery, and the California Science Center in Los Angeles will get Endeavour. Plans call for Atlantis to be displayed in a 66,000-square-foot building as if in orbit. The building also will boast major displays highlighting the International Space Station and the Hubble Space Telescope -- two hallmark accomplishments tied to the 30-year shuttle program. Moore said Atlantis won't look all shiny and new in the exhibit, but rather will show signs of its flights -- to "show her 'dirty,' " as he puts it. Visitors will be able to get close to -- but not quite touch -- Atlantis, getting a good feel for the size of the orbiter and its main engines. The exhibit will include a number of interactive exhibits for children and adults, as well as simulators based on astronaut training. These may include simulations that demonstrate grabbing a satellite, docking at the International Space Station, experiencing re-entry or maneuvering a robotic arm. Other displays include a space station gallery showing visitors what it's like to live in space, as well as a

model of the space station that children can crawl through. The exhibit will be built on a site near the visitor complex's popular Shuttle Launch Experience simulator. The Atlantis exhibit is part of a 10-year master plan to upgrade the visitor complex, which is Brevard County's most popular paid tourist attraction, drawing about 1.5 million visitors a year. The complex hopes to boost that by 225,000 with the Atlantis exhibit. Web posted. (2011). [Space shuttle: A legacy to behold [Online]. Available WWW: http://www.floridatoday.com/ [2011, July 21.]

**July 22: Taurus 2 Debut Delayed Two Months by Launch Pad Issues**

The inaugural flight of Orbital Sciences Corp.'s Taurus 2 rocket will be delayed by about two months, to December, to allow time for the completion and certification of rocket propellant and pressurization facilities at the vehicle's Wallops Island, Va., launch site, Orbital Chief Executive David W. Thompson said July 21. Dulles, Va.-based Orbital still intends to demonstrate its space station cargo vehicle on the second Taurus 2 flight about two months after the first successful liftoff, meaning that mission, in which the Cygnus capsule will approach the international space station, will be delayed to February, Thompson said. Web posted. (2011). [Taurus 2 Debut Delayed Two Months by Launch Pad Issues [Online]. Available WWW: http://www.spacenews.com/ [2011, July 22.]

**Shuttle contract workers head out**

On Thursday, Mark Nappi greeted the final four shuttle astronauts on Kennedy Space Center's runway as they climbed out of Atlantis in a triumphant end to a 13-day mission and the 30-year shuttle era. Today, the leader of United Space Alliance's Florida operations has many more hands to shake but for a less happy occasion. The end of the final mission means the end of shuttle careers today for 1,510 local USA employees who will arrive in waves at a Cape Canaveral facility to process layoff paperwork and receive parting gifts. As NASA's lead shuttle contractor, Houston-based USA has borne the brunt of long-planned layoffs that began a steady downsizing two years ago. The company's total work force after today will be two-thirds less than its peak of 10,500 in 2005, with more cuts planned through August. The total at KSC will drop roughly in half to about 1,500 by the end of August, and their future is uncertain. KSC hosted an appreciation event that gave center employees and their families a chance to take pictures with Atlantis after it was towed back from the runway. Bands played and participants waved American flags as senior managers and the Atlantis crew offered praise. As the shuttle fleet neared retirement, many outside the agency questioned whether the final missions could be flown safely amid all the distractions of layoffs and the resulting loss of skills and experience. In fact, the last missions reported few technical problems and NASA thinks they were among the safest flown. "They've know that this was coming, but yet they performed in an absolutely superlative level right up until the very end," said Bob Cabana, KSC's director. "It just shows how good these people are." Additional layoffs are planned through Aug. 31, with much smaller numbers locally and a bigger impact in Houston. Local work force officials think the current wave of layoffs could cut about 2,300 KSC jobs including other shuttle contractors. The company's primary focus during the next year or so will be closing out the shuttle program, but there's other work preparing facilities and equipment for NASA's planned exploration capsule and rocket. Web posted. (2011). [Shuttle contract workers head out [Online]. Available WWW: http://www.floridatoday.com/ [2011, July 22.]

**July 24: Voyages to deep space will originate from shuttle pads**

With demolition nearly complete on Kennedy Space Center's northernmost launch complex, NASA plans to put launch pad 39A into mothballs in the coming months for long-term storage until human expeditions depart for asteroids or Mars, according to agency officials. After space shuttle Atlantis blasted off July 8 from pad 39A, technicians started several weeks of standard post-launch cleanup and repairs. But with no more missions on the pad's manifest, normal work on the complex will cease in the next few weeks, according to a NASA spokesperson. The space shuttle's two beachfront launch pads at the Florida spaceport supported a rapid cadence of flights over the last 30 years, but NASA launched its last shuttle from launch pad 39B in 2006 as the program entered its final years. After finishing back-up rescue duty

for the space shuttle's last servicing mission to the Hubble Space Telescope, pad 39B hosted the test launch of the Ares 1-X rocket in October 2009. A private contractor began dismantling the pad's fixed and rotating service structures last summer, and the demolition team removed the final major pieces of the complex earlier in July. It took 10 months to complete the lion's share of the work due to interruptions from shuttle operations at nearby pad 39A, which lies about 1.6 miles south of pad 39B. There's no funding for similar safing and demolition of pad 39A. NASA will instead keep the facility in its current state for now, according to Bob Cabana, director of the Kennedy Space Center. Cabana said the launch pad will go into a "caretaker" status, much like the mammoth Vehicle Assembly Building, which will one day be needed for new human expeditions into deep space. NASA officials envision pad 39B as the initial home for a heavy-lift rocket to haul humans and cargo into deep space on voyages to asteroids, the moon, Mars and other destinations. The space agency is finalizing the design of the Space Launch System, which will likely use shuttle-derived hardware, engines and other equipment. NASA managers, the White House and independent consultants are reviewing the design before it is released to the public and contractors. NASA says the SLS won't be flying astronauts until 2020 under current budget projections, but Kennedy Space Center aims to have the launch pad ready years before then. "We'll press ahead to have it ready as soon as we possibly can for accommodating NASA rocket launches off it," Cabana said. Pad 39B's future concept will utilize a clean pad design with no permanent structures. The rocket's servicing tower will be bolted to the mobile launch platform and rolled to the pad for final preparations. A 390-foot-tall mobile launcher designed for the canceled Ares 1 rocket sits outside the VAB. Although the tower doesn't have a mission now, it could be modified for commercial launchers or NASA's heavy-lift rocket program. Officials currently foresee pad 39B being tailored for the Ares mobile launcher, whatever vehicle it ends up carrying. Engineers are upgrading the pad 39B's computers, electrical network and control systems. NASA is also refurbishing propellant tanks at the seaside facility. Three 600-foot-tall lightning masts were erected at pad 39B in 2009 as part of a next-generation weather protection system for large rockets. The pad's concrete surface, first constructed for the Apollo program in the 1960s, will remain intact for the next space program. NASA elected to demolish the pad structures with cranes and cutters instead of explosives to ensure the concrete wasn't damaged by falling debris. Launch pad 39B was first used by the Saturn 5 rocket on the Apollo 10 mission, a dress rehearsal for the first lunar landing. Saturn 1B rockets launched crews on missions to the Skylab space station in 1973. Three astronauts took off from the pad aboard another Saturn rocket in 1975 on a mission to dock with a Soviet Soyuz spacecraft during a detente in Cold War relations. The pad's servicing towers were used to prepare 53 space shuttle missions for flight between 1986 and 2006, beginning with the final launch of the shuttle Challenger. The Ares 1-X test flight also used the pad for its launch in October 2009. Pad 39A was the departure point for 82 shuttle flights and every Apollo mission that landed on the moon. Web posted. (2011). [Voyages to deep space will originate from shuttle pads [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, July 24.]

**July 25: Hired private cargo ships booked to visit space station**

With the International Space Station stocked with food and clothing by the last space shuttle mission, SpaceX and Orbital Sciences are gearing up for test flights of their cargo freighters to the orbiting lab in December and February, government and industry officials said. The commercial automated cargo vehicles are in the final stages of development and testing before moving to their launch sites in Florida and Virginia. NASA has "technically" agreed to combine SpaceX's next two demonstration flights of the company's Falcon 9 rocket and Dragon capsule, electing to send the next mission all the way to the space station, according to Bill Gerstenmaier, the head of the agency's human space programs. The unmanned flight would blast off Nov. 30 from Cape Canaveral and reach the space station about one week later, where the lab's Canadian robot arm would reach out and grapple the approaching Dragon spaceship. SpaceX and NASA are reviewing plans for the mission, which would deliver some limited cargo to the complex. If everything goes as planned, SpaceX's first operational resupply flight would launch in the first half of 2012. Working under a funded Space Act Agreement with NASA, SpaceX tested the medium-lift Falcon 9 rocket on two flights in 2010. The second launch in December demonstrated the

blunt Dragon capsule on two orbits around Earth, culminating in a successful splashdown and recovery in the Pacific Ocean. The first and second stages of the Falcon 9 rocket for SpaceX's cargo flight are already at the company's Cape Canaveral launch pad. The Dragon spacecraft is due to arrive in August or September. Two months after SpaceX's first mission to the space station, Orbital Sciences plans to launch its inaugural Cygnus resupply ship. The company foresees the mission launching in February 2012, according to David Thompson, chairman and CEO of Orbital Sciences. Orbital Sciences holds a $1.9 billion Commercial Resupply Services contract with NASA to serve the International Space Station with eight flights of the Taurus 2 rocket and the robotic Cygnus cargo freighter. The contract requires Orbital to deliver 20 metric tons, or about 44,000 pounds, of equipment to the complex over the eight missions. SpaceX signed a similar contract worth $1.6 billion for 12 flights of the Falcon 9 rocket and Dragon capsule. Both companies have Space Act Agreements, funneling government financing to help design, build and test commercial spacecraft for cargo resupply missions to the space station. The NASA funding is coupled with private investment. Web posted. (2011). [Hired private cargo ships booked to visit space station [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, July 25.]

**Juno Probe Heads to Launch Pad**

NASA's Juno, an innovative and ambitious mission intended to resolve some long-standing mysteries about the formation of Jupiter and the Solar System, headed to the launch pad in Florida July 25 in anticipation of launching Aug. 5. The spacecraft's five-year trek to Jupiter is scheduled to begin with an 11:34 a.m. EDT liftoff onboard a United Launch Alliance Atlas 5 rocket from Cape Canaveral Air Force Station's Launch Complex 41. The rocket, flying in the 551 vehicle configuration with a five-meter faring, five solid-rocket boosters and a single-engine Centaur upper stage, will propel Juno out as far as the orbit of Mars before the spacecraft cycles back around the Sun for a flyby of Earth in October 2013 and a gravitational boost to Jupiter. Upon arrival in 2016, the solar-powered Juno will be hurling along at 160,000 mph, the fastest man-made object in history. Web posted. (2011). [Juno Probe Heads to Launch Pad [Online]. Available WWW: http://www.aviationweek.com/ [2011, July 26.]

**July 26: NASA hopes to shuttle former employees into new jobs**

NASA is holding a career fair in Cape Canaveral, Florida, on Tuesday to help its former contract employees to find new jobs now that the shuttle program is ending. Among those who will be rubbing elbows with government and private recruiters are some of the engineers NASA hired to maintain the shuttle's 20 different systems – "every part of the shuttle that required a team of engineers and technicians to get it ready for the next flight," said Lisa Malone, a NASA spokeswoman." Over the years, NASA has been downsizing those teams, with Cape Canaveral seeing the most layoffs, including 1,500 on Friday, Malone said. "I would say the lion's share of (the layoffs) has been in Florida," she said. According to a fact sheet from NASA, the agency plans to lay off 2.223 Florida "shuttle prime contractors" in fiscal 2011, for a total of 4,371 layoffs in Florida since 2008. At the end of the year, NASA expects to have laid off 9,425 shuttle contractors nationwide since 2008. In addition to engineers, NASA's contract employees included accountants, human resources personnel, "everything it takes to run an organization," Malone said. Workers have known about impending layoffs, in some respect, since President George W. Bush announced the end of the shuttle program, Malone said. She said NASA and the recruiters hope about 1,000 former employees will come to the career fair and apply for new jobs. Web posted. (2011). [NASA hopes to shuttle former employees into new jobs [Online]. Available WWW: http://www.cnn.com/ [2011, July 26.]

**Atlantis Undergoes Post-Flight Servicing**

Five days after finishing NASA's 135th and final shuttle flight, the orbiter Atlantis is undergoing post-flight servicing in its processing hangar at Kennedy Space Center. NASA contractor technicians drained the orbiter's power-producing fuel cell system this week. The Power Reactant Storage & Distribution (PRSD) system combined liquid hydrogen and liquid oxygen to generate electricity to run spaceship systems. The chemical reactants generate water as a byproduct. Technicians today are preparing to open

the shuttle's payload bay so that the cylindrical Raffaello module can be removed. The module is filled with surplus gear and trash from the International Space Station to clear up storage space on the outpost. Rigid steel frames called strongbacks have to be put in place to open the doors. Coming up later this week: Technicians will start post-flight servicing of the shuttle's Orbital Maneuvering System and Reaction Control System. The OMS features twin engines that were ignited to drop Atlantis out of orbiter for its era-ending atmospheric reentry last Thursday. The Reaction Control System features 44 nose-and-tail steering thrusters. Atlantis is be prepped for display at the Kennedy Space Center Visitor Complex. Web posted. (2011). [Atlantis Undergoes Post-Flight Servicing [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, July 26.]

**July 27: Apollo 15 Celebrates 40th Anniversary at KSC**

Apollo 15 was the first manned lunar mission to use a lunar rover, and the first of the "J" missions that would stay on the lunar surface longer and be focused on conducting science. The mission is marking its 40th anniversary now, and most of the crew (some other Apollo-era astronauts) were present at the Kennedy Space Center Visitor Complex to recall the occasion. The day's events included a tour of the launch site at the adjacent Cape Canaveral Air Force Station. Shortly after returning to the Visitor Complex a panel discussion was held with Apollo 15 astronauts Dave Scott and Al Worden. The "moderator" for the event was none other than Apollo 12 Command Module Pilot Dick Gordon. One thing that became quickly obvious was that the trio had done this before and were very comfortable with one another, clowning around, giving each other a hard time and telling jokes. Meanwhile, Gordon asked the two surviving Apollo 15 astronauts (the third member of the crew, James Irwin, passed away in 1991) questions regarding the mission. This made learning about the importance of the mission both informative and fun. Panel discussions can be rather dry affairs – this one was lively and entertaining. The operators of the Kennedy Space Center Visitor Complex spared little expense in ensuring that guests had a full and exciting day. The tour drove past several launch complexes including Launch Complex 34 (where the Apollo 1 fire occurred), as well as Launch Complex 39A, where the final shuttle mission launched from not too long ago. Each of the buses had the normal guide from the Visitor Complex, as well as an Apollo-era astronaut, who regaled guests with various aspects of past missions. Guests also received a gift bag with several items enclosed to commemorate the occasion. Apollo 15 launched on July 26, 1971, and ended with the splash down of the crew on Aug. 7, 1971. Scott and Irwin spent a total of three days on the moon with a little over 18 hours of that time spent in EVA. Apollo 15 was also the first mission to not land on a lunar mare, but rather it landed near Hadley Rille, which is located around the area called Palus Putredinus (Marsh of Decay). Having the lunar rover on this mission gave the moonwalkers the ability to traverse a far greater distance than what was possible on prior Apollo flights. While on the moon the duo collected about 170 lbs. of rocks and lunar regolith. While Scott and Irwin were on the moon, Worden, circling high above in the Command Module compiled a highly detailed map of the lunar surface. A satellite was also deployed into lunar orbit on this mission (an Apollo first). Web posted. (2011). [Apollo 15 Celebrates 40th Anniversary at KSC [Online]. Available WWW: http://www.aviationweek.com/ [2011, July 27.]

**DOE, Interior Eye Employees Jettisoned by Space Program**

The Energy Department and the Department of the Interior are among dozens of federal agencies looking to hire some of the engineers and scientists from NASA's closing space program. NASA and the Office of Personnel Management held a job fair yesterday in Cape Canaveral, Fla., less than a week after the space shuttle *Atlantis* landed. All told, about 5,500 contract employees at Florida's Kennedy Space Center have lost their jobs in recent months, and NASA contractors are expected to lay off another 2,000 over the next year. For an area nicknamed the "Space Coast," the end of the space program is a blow. But federal agencies are swooping in to take advantage of a pool of employees they say have skills that are usually hard to find. It is unclear how many former NASA contractors have found new jobs in the federal government. But representatives from 32 federal agencies attended yesterday's job fair, while several more are participating in a virtual job fair hosted by OPM and NASA. Among them is DOE's Oak Ridge

National Laboratory, where open positions range from nuclear engineers to carbon fiber researchers. Human resources director Debbie Stairs said Oak Ridge has hired NASA employees in the past with success. One potential area of overlap, she said, is materials research. Interior's Bureau of Land Management has also targeted former NASA employees. While officials declined to provide details on what positions might best fit those who worked on the space program, listings on USAJOBS.gov included positions in the physical and engineering sciences. But such jobs are based all over the country, and many former NASA employees may be unwilling or unable to relocate. Brevard Workforce -- which helps find jobs for the unemployed in Brevard County -- has been working for four years to line up potential jobs openings with an emphasis on keeping workers in Florida. So far, the organization has confirmed that about 550 NASA contractors have found new jobs, many locally, said Judy Blanchard, Brevard's director of industry relations. Part of the group's goal, she said, is to transform the Space Coast into a robust energy market. The pool of laid-off employees essentially consists of three groups: those who performed administrative duties, those who had technical jobs such as mechanics and those with high-level degrees such as engineers and scientists. But unlike Houston -- where thousands of NASA employees are also finding themselves unemployed -- Brevard County is not a diversified metropolitan area. Former NASA workers also do not have as many options in the oil industry if they want to stay close to home, whereas Texas lawmakers have urged Interior to retrain space shuttle workers to inspect offshore oil rigs. The entirety of Brevard County, meanwhile, has a population of about 600,000 people. Blanchard said local companies -- such as lighting product manufacturer Lighting Science -- have hired former Kennedy Space Center employees, and aviation companies such as AAR Aerospace and Brazil-based Embraer are setting up offices in the area. But no one entity is the answer; companies hire five, 10, maybe 20 employees at a time when thousands need jobs. And Brevard County cannot hold them all. Web posted. (2011). [DOE, Interior Eye Employees Jettisoned by Space Program [Online]. Available WWW: http://www.nytimes.com/ [2011, July 27.]

**Jupiter-bound Juno probe mounted atop its launcher**

With just 9 days left until blastoff, Juno has been placed atop the United Launch Alliance Atlas 5 rocket that will send the spacecraft on its journey to Jupiter. Already packed within the Swiss-made nose cone, the satellite was raised off the ground by overhead cranes and gently maneuvered through the open doorway of the rocket's vertical assembly hangar just after 9 a.m. this morning. It was positioned over the Centaur upper stage and successfully attached at 10:42 a.m. EDT. Work to affix the nose cone's ogive section was continuing late into the evening. Functional testing of the spacecraft is planned for Thursday, then the combined systems test between Juno and the Atlas vehicle will occur on Friday. "We'll make sure the satellite is talking to the rocket, the rocket is talking to the satellite and everything is ready," said Mike Woolley of United Launch Alliance. The fully stacked rocket now stands 20 stories tall. The vehicle features a main stage fed with refined kerosene and liquid oxygen, five strap-on solid propellant boosters, the liquid hydrogen-powered cryogenic Centaur upper stage and a composite payload shroud 16 feet in diameter. This is the largest, most energetic version of the Atlas 5 rocket currently available. The so-called 551 configuration has been used only once in the previous 26 flights by the vehicle, launching NASA's New Horizons probe to Pluto in 2006. Web posted. (2011). [Jupiter-bound Juno probe mounted atop its launcher [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, July 27.]

**NASA Safety Chief to Step Down from Post**

NASA safety chief Bryan O'Connor, who also is a veteran shuttle pilot and mission commander, is leaving the space agency at the end of August. O'Connor said in a statement that the successful completion of NASA's 135th and final shuttle mission prompted his decision to depart NASA on Aug. 31. Web posted. (2011). [NASA Safety Chief to Step Down from Post [Online]. Available WWW: http://www.floridatoday.com/ [2011, July 27.]

**July 28:** **Merritt Island Launch Annex had little known launch role**

For 45 years, an unassuming tracking station tucked behind Kennedy Space Center provided critical data, telemetry and voice communication links to hundreds of launching rockets, circling satellites and landing shuttles. But the station known as MILA -- short for Merritt Island Launch Annex -- supported its last mission this month with shuttle Atlantis' launch and safe return. In a ceremony Thursday morning, NASA officially decommissioned the aging facility before some components are salvaged for other sites and the rest is demolished. "Not only have you participated in some of NASA's boldest adventures, but you've made a difference," Gary Morse, the station's NASA director, told dozens of employees and guests. A color guard from Patrick Air Force Base lowered and folded an American flag flown outside the control center. Then Morse gave the cue to slew one of two 30-feet-wide S-band radio antennas for the last time into its parked position. Inside, chief technician Jim Stefanov pressed a button marked "Auxiliary" and the giant dish, which had been angled at the shuttle runway, slowly tilted back to point up at the sky. The crowd cheered. MILA supported its first launch in July 1966, an unmanned test flight of a Saturn I-B rocket whose upper stage ultimately broke apart in orbit. Data the station received helped define the rocket's performance for manned flights and "was critical to going to the moon," said Jeff Volosin, associate director for exploration and communications at NASA's Goddard Space Flight Center in Maryland, which owned MILA. The station expanded to support launches of expendable rockets and for years was staffed around the clock to track NASA satellites as they passed. "There was a time when MILA tracked everything," said George Diller, a Kennedy spokesman. "If it went overhead, they tracked it." A space-based system of tracking and data relay satellites gradually phased out the need for many of 17 ground stations around the world established for Apollo, but MILA endured because of its critical role in shuttle launches and landings, its primary function in recent years. During the first roughly seven minutes of a shuttle's ascent and the 13 minutes before touchdown, MILA provided information helping flight teams assess the health of orbiter systems and its location. MILA never faltered during countdowns, when it was one of the teams required to give a "go" in the final minutes for a launch to proceed. "You have never, ever been the reason for a launch scrub or a delay," said Mike Leinbach, the shuttle launch director. Roughly 50 employees of LJT Associates, the contractor that operates the station, recently adopted a motto proudly displayed on shirts: "Every mission, every time -- MILA is go." For all its reliability, MILA, which cost about $7 million annually to operate, relied on a hodge-podge of modern and antiquated systems. Entering the large, open control room feels like taking a step back in time: rows of gray electronics racks and consoles, still humming and blinking, look as if they might be ready for an Apollo countdown. Many systems were upgraded over the years, of course, but a former station director said some Apple IIe computers were still in use and managers joked they had to scour Internet auction sites like eBay to find some spare parts. MILA's need for a clear line of sight to the shuttle launch pads and runway even influenced the shape of some Visitor Complex buildings, officials said. With the shuttle program over after 135 missions, about 20 LJT employees will be the first laid off from MILA positions today. Its doors will close for good Sept. 1. KSC then will oversee demolition of the one-story control center and the dishes. NASA eventually plans to build a new, state-of-the-art station in a new location -- on the other side of the Visitor Complex -- to support launches of a heavy-lift rocket planned for exploration missions. "The legacy of this site will live on well beyond today," said Volosin. Web posted. (2011). [Merritt Island Launch Annex had little known -- but important -- launch role [Online]. Available WWW: http://www.floridatoday.com/ [2011, July 28.]

**STS-135: ET camera functions through ascent – no usable video of reentry**

Providing stunning images of the grand finale of the Shuttle Program, the External Tank (ET) camera on ET-138 concluded a 22-flight legacy - beaming back images of the tank's performance through ascent. However, a camera modification was ultimately unsuccessful in transmitting much more than static footage of the tank as it tumbled into Earth's atmosphere for its death plunge into the Pacific Ocean. As was the case 21-times before, the ET engineering camera on the LOX feedline of the External Tank functioned perfectly through pre-launch and launch activities during Space Shuttle Atlantis' historic and sentimental journey to Low Earth Orbit on July 8. During the launch of STS-135, the ET camera provided NASA managers and DAT (Damage Assessment Team) personnel with an early look at the

tank's performance as well as any areas of Atlantis' TPS (Thermal Protection System) that might have been dinged by small foam liberations from the tank. In all, the quick-look assessment enabled by the ET camera led to the understanding that this was one of the most – if not THE most – clean External Tanks in the history of the Shuttle Program: an in-flight tribute to the hard work and dedication of thousands of NASA engineers and the honorable workforce at the production facility in New Orleans, Louisiana. This quick-look assessment of Atlantis' TPS was confirmed on FD-2 and FD-3 of the STS-135 mission when it was revealed that Atlantis had sustained only one lower-surface TPS ding from ET debris. But while the camera (a Sony XC-999) and its systems worked perfectly on every single one of the 22 post-Columbia Shuttle missions, the camera actually debuted on STS-112, providing images up to SRB separation when debris covered the camera lens and prevented further clear image downlink. Moreover, the camera's primary use on STS-112 - a mission by Atlantis in October 2002 - was for PAO launch coverage purposes and not for engineering assessment of the Tank's TPS performance - an ironic use considering the rather significant foam liberation event that occurred on STS-112 and subsequent foam liberation event on STS-107/Columbia that ultimately made the camera mandatory for tank engineering assessment purposes. Web posted. (2011). [STS-135: ET camera functions through ascent – no usable video of reentry [Online]. Available WWW: http://www.nasaspaceflight.com/ [2011, July 28.]

**July 29: Atlas and Delta rockets arrive together**

Another space first: The company that launches Atlas and Delta rockets delivered a combined shipment of both vehicles for the first time this week. The United Launch Alliance Delta Mariner sailed into port with the Atlas V that will launch NASA's $2.5 billion Mars Science Laboratory in November. The ship also carried the Delta IV rocket that will launch an Air Force communications satellite in December. It was the first time the ship delivered both Atlas and Delta hardware. A joint venture partnership of Boeing and Lockheed Martin, ULA originally manufactured Atlas rockets in Colorado and used cargo aircraft to transport them to Cape Canaveral. The company moved that work in 2009 to a Delta IV manufacturing plant in Decatur, Ala. The Delta Mariner was built to transport Delta IV rockets from that plant to the launch site. Mark Wilkins, vice president of ULA Program Operations, said the combined shipment saved the company $800,000. The 312-foot Delta Mariner can travel on rivers and open seas. The trip from the plant to the launch site is more than 2,100 miles and takes eight to 10 days. Web posted. (2011). [Atlas and Delta rockets arrive together [Online]. Available WWW: http://www.floridatoday.com/ [2011, July 29.]

**Ex-astronaut Lisa Nowak forced out of U.S. Navy**

A former astronaut banished from NASA after she confronted a romantic rival in a bizarre episode is being kicked out of the Navy, officials said Thursday. Capt. Lisa Nowak will retire with an "other than honorable" discharge and her pay grade will be knocked down one rank, Assistant Secretary of Navy Juan Garcia said in a statement. Nowak's conduct "fell well short" of what is expected of Navy officers and she "demonstrated a complete disregard for the well-being of a fellow service member," Garcia said. Nowak was accused of confronting Colleen Shipman in the parking lot of the Orlando International Airport in February 2007 after driving from Houston. Since her dismissal from the astronaut corps, Nowak has been working at the Chief of Naval Air Training station in Corpus Christi, Texas. She will be demoted to commander when her retirement takes effect Sept. 1. Web posted. (2011). [Ex-astronaut Lisa Nowak forced out of U.S. Navy [Online]. Available WWW: http://www.floridatoday.com/ [2011, July 29.]

**Children of Lockheed workers spend day expanding minds and having fun**

Children of Lockheed Martin employees enjoyed a day of mind-expanding activities July 20 through a program called Young Minds At Work. The event at Cape Canaveral Air Force Station allows parents to showcase their place of work while encouraging youngsters to study and consider potential careers in science, engineering, math and technology. Lockheed Martin partnered with United Launch Alliance and SpaceTEC for this year's daylong program and more than 200 students participated. Various sessions

include an Atlas V mock launch countdown, Delta IV tour, speed mentoring, "Capt. Orion and His Amazing Flying Machines, " basic missile telemetry and guidance 101, design 101, and build-and- race an edible car workshop. Additional key activities included a SpaceTEC-sponsored workshop on building and launching a water rocket, demonstrations by the Merritt Island Robotics Team and the Sea Cadets' posting of the colors. Web posted. (2011). [Children of Lockheed workers spend day expanding minds and having fun [Online]. Available WWW: http://www.floridatoday.com/ [2011, July 29.]

**July 31: Space program's environmental cleanup could take decades**

NASA spent decades to send men to the moon, launch the space shuttles and build a laboratory in space, and now it will take a century to clean up the chemical messes left behind. Plumes of carcinogenic chemicals used in the launching of the space shuttles, Apollo moon shots and other rockets seeped deep into sandy soils beneath launch pads and other structures at Kennedy Space Center and Cape Canaveral Air Force Station. They form viscous toxic goo that will take $1 billion in cleanup costs agencywide over many decades, and could bog down funding for next-generation spacecraft. NASA estimates it will spend $96 million in the next 30 years at Kennedy Space Center, including $6 million this year. The Air Force says it will take another $50 million to get the rest of its cleanups at Cape Canaveral under way by 2017. "In the past, back in Apollo, the normal disposal of the solvent cleaning was down the drain … out the back door," said Rosaly Santos-Ebaugh, Kennedy's remediation program manager, the person responsible for leading the cleanup. A Florida Today analysis of hundreds of pages of Kennedy and Cape Canaveral Air Force Station cleanup records and extensive databases of toxic spills obtained under the Freedom of Information Act found: *At least 2 square miles of chemically contaminated soil and groundwater, some of the "plumes" reaching as deep as 90 feet, at Kennedy and the air station, where the earliest rockets blasted off. That includes 600 acres of chemical plumes at Kennedy or nearby sites under former NASA control and 1,030 acres at Canaveral. *Of 267 known contamination sites at Kennedy or under former NASA control, 141 are cleaned up. The other half are either under investigation, undergoing treatment or left for contaminants to break down naturally. *By far, the most common contaminant is a chlorinated solvent called trichloroethylene, or "trike," and its breakdown products -- substances known to cause birth defects and cancer and reaching concentrations thousands of times higher than federal drinking water standards allow. No one drinks water drawn at the space center, nor the air station, but federal law still mandates the cleanup, at taxpayer expense. Other potential harm to humans and wildlife is uncertain. Most of the contamination occurred before federal standards and science caught up with the potential dangers, and today's launches contribute little to the environmental pollution. Spaceflight was a dirty business. And astronauts walked the moon in 1969, a year before President Richard Nixon established the Environmental Protection Agency. "So we can put a man on the moon, but we don't have all the regulations in place so we can understand the effect of some of the chemicals that were disposed of," NASA scientist Jackie Quinn said in describing how the contamination was allowed to occur. From 1959 to 1968, during Apollo when NASA launched Saturn rockets from Launch Complex 34 at Cape Canaveral, trike went straight into the ground. An estimated 88,000 pounds of the solvent soaked into the soil and groundwater. Kennedy's sandy, alkaline soils are thought to neutralize most metals and other contaminants before they become a problem up the food chain. But trike dies hard. And workers kept pouring it into the ground in the early years of the shuttle program, thinking it would evaporate. Industry chemists knew as far back as the 1940s that trike could contaminate groundwater, according to research by Steven Amter, an environmental consultant in Washington, who has written a book on the history of industrial pollution. Safety guidelines for trike were among the first Chemical Safety Datasheets published by manufacturers in 1947, Amter said. They advised users to pour the solvent on "dry sand, earth, or ashes at a safe distance from occupied areas" to promote evaporation. That practice since has proved ineffective, given all the trike that seeped into groundwater at Kennedy and elsewhere. Few but chemical industry insiders and scientists who studied groundwater understood the full implications of the early guidelines. "It doesn't say just pour it on the ground and forget it," Amter said. "It was intended to promote evaporation, not infiltration into the ground." NASA officials couldn't cite the year Kennedy Space Center workers stopped pouring trike on the ground, but said they did so when the Materials Data

Safety Sheets first warned against the practice. Dow Chemical's safety sheet in 1974 and General Electric's in 1978 recommended used solvents be sent to a licensed disposal company. After Congress passed extensive hazardous waste regulations in 1980, Amter said, trike users should have been aware of the risks to groundwater. "Anything you didn't want to drink, you shouldn't be putting in the ground." Historically, NASA has spent an average of $8 million to $10 million a year treating trike and on other cleanups at the space center, at least through 2009. Last year, funding for cleanups dropped to $4 million, then increased to $6 million this year. Since 1989, NASA has spent $128 million on environmental cleanups at Kennedy. Florida environmental regulators enforce cleanup standards at Kennedy, but it was federal law that first forced NASA in the 1980s to begin assessing hazards to humans and the environment. Ultimately, they unearthed the 267 sites, most with trike as the main contaminant. The largest: a 352-acre plume at Canaveral air station's Launch Complex 34 -- site of the 1967 Apollo 1 fire that killed three astronauts. NASA, in most cases, can't tell if spills are from the shuttle or other programs such as Apollo. Solvents foul surface waters around the main shuttle pad, 39B -- a National Historic Site, and the more polluted of the two shuttle launch pads. Flame retardants, arsenic and nickel also penetrate the soils there. The pad launched 52 shuttle flights, all three Skylab missions and the Apollo-Soyuz test flight. NASA began dismantling the pad earlier this year to clear the way for future, larger rockets. Most of the trike at the launch pads is stopped from reaching deeper aquifers -- where drinking water could be drawn -- by a natural clay layer about 40 feet underground. But in some spots, the solvents reach depths of 90 feet. Left alone, all the trike at Launch Complex 34 would take 300 years to naturally break down, NASA officials say. With human intervention, it might still take a century. Traditionally, solvent cleanups involved pumping up contaminated groundwater and treating it -- a lengthy, expensive and not-always-successful process. The dense liquid solvents are tough to pump. But Quinn's homestyle blender churns up promising and cheaper solutions, using tabletop ingredients such as corn oil and more-exotic substances such as nanoparticles. In a small lab in Kennedy's Operations and Checkout Building, the same place astronauts suit up before launch, it sloshes iron powder and corn oil into a gray goop. The method, called emulsified zero-valent iron (EZVI), requires injecting the salad-dressing-like mix into plume hot spots, where it finds and binds to the similarly dense solvents, rendering them harmless. It does the same to heavy metals such as chromium, arsenic and lead. "The technique works well and it works fast," said Quinn, an environmental engineer with NASA's Surface Systems Office, who developed EZVI along with University of Central Florida scientists. The iron particles float in oily bubble blobs that enclose the solvents and break them down into natural, nontoxic salts and gases. Naturally occurring bacteria consume the leftover vegetable oil. "It's totally nonhazardous byproducts," Quinn said. The idea, which began on the back of a napkin, won its inventors a place in NASA's Space Technology Hall of Fame in 2007. NASA licensed the technology to several companies, and now 16 states and several countries, including France and Japan, use it. But Kennedy Space Center has a long way to go in solving its trike troubles. "It's not just a problem that's affiliated with us, it's a global problem," Quinn said. "Environmental cleanup science is a very young science." Web posted. (2011). [Space program's environmental cleanup could take decades [Online]. Available WWW: http://www.usatoday.com/ [2011, July 31.]

## AUGUST

**August 1: NASA Shuttle Fleet Finds New Life in Displays, Parts**

NASA's space shuttle fleet will never fly again, but the agency believes it still has plenty to learn from the iconic vehicles. NASA technicians prepping the grounded shuttles for delivery to museums have been instructed to pull out and hang onto many different pieces, from the windows near the nose to the huge main engines near the orbiters' tails. Agency engineers will study these parts to help inform development of future spaceships— and some of the hardware may even be used again. "No other vehicle has had anywhere close to the same number of cycles on a lot of this hardware as the shuttle has," said Jonathan Krezel, who's in charge of the shuttle transition and retirement program at NASA headquarters in Washington, D.C. "Some of this stuff is 25 years old or more. So from the point of view of creating long-duration survivable space systems in the future, there's a lot of interest." The touchdown of Atlantis on July 21 marked the end of NASA's shuttle program after 30 years of operation and 135 space missions. Atlantis and the other two remaining orbiters, Discovery and Endeavour, are headed to museums, where they will teach and inspire the public for years to come. Atlantis will retire to the Kennedy Space Center Visitor Complex in Florida, Discovery to the Smithsonian Air and Space Museum in Washington, D.C. and Endeavour to Los Angeles' California Science Center. But the shuttles aren't being ferried straight from the landing strip to the exhibit hall. All three must undergo a lengthy decommissioning process, much of which is done for safety reasons. Anything that touched rocket fuel— the thruster system inside each shuttle's nose, for example — must be removed and scrubbed clean before it's reattached. Other parts will be permanently removed due to safety concerns. For example, flight-ready shuttles are studded with small explosive charges that perform various functions, such as deploying landing gear if normal systems fail. These pyrotechnics are all coming off, Krezel said. But safety is not the only driver in this spaceship stripping. Research is a key factor as well. Web posted. (2011). [NASA Shuttle Fleet Finds New Life in Displays, Parts [Online]. Available WWW: http://www.space.com/ [2011, August 1].]

**NASA Kennedy Space Center Visitors Could Win a Trip to Space**

Current visitors to the Kennedy Space Center could now win an actual trip into space on board the XCOR rocket aircraft. The trip is just one part of a nearly $100,000 prize contest by NASA at the Space Center this summer. In addition to "Star Trek: The Exhibition" which has been running since June, continuing through September, KSC is trying to draw more crowds to its visitor's complex with a big summer contest. Admission to the complex automatically enters one into the contest. A suborbital flight in a two-seat XCOR Aerospace Lynx spacecraft is part of the two grand prizes in the contest. According to KSC, the Lynx will be piloted by retired astronaut Richard Searfoss, who participated in three space shuttle missions in the 1990s, center officials said. The flight takes off and lands on a conventional runway and should last for about 45 minutes. Winners of the grand prize will spend five days training for the flight before the launch. Web posted. (2011). [NASA Kennedy Space Center Visitors Could Win a Trip to Space [Online]. Available WWW: http://www.newstaar.com/ [2011, August 1].]

**NASA Bets Big Rover On Novel Landing Scheme**

NASA will try a completely new—and scary—technique to land the largest rover yet on the surface of Mars next year, in a spot that scientists hope will tell them whether the planet can, or ever could, support life. Crews from the Jet Propulsion Laboratory (JPL) and Kennedy Space Center are in the final stages of preparing the $2.5 billion Mars Science Laboratory (MSL) for an Atlas V launch to the red planet as early as Nov. 25. If all goes as planned, the probe will reach Mars next August and begin its harrowing 6-min. descent through the atmosphere. After an entry that includes a temporary shift in the capsule's center of gravity to gain lift before parachute deployment for a precision approach, the lander will go into a rocket-powered hover and lower the rover to the surface on nylon cords. Engineers at JPL adopted the "Sky Crane" landing technique because, at 850 kg (1,870 lb.), the six-wheel rover, dubbed Curiosity, is more than twice as heavy as the twin Mars Exploration rovers (MERs) combined. That makes car-sized

Curiosity too large for the parachute/airbag combo used so successfully by the Pathfinder mission's Sojourner rover and the two MERs, Spirit and Opportunity. Despite the complexity of the mission, the project manager says he's confident in his engineering team, given the heritage and testing that went into the MSL hardware. His bigger fear, as so often in aerospace, is what he doesn't know about yet, including accidents and simple human error. The mission escaped a serious delay in May when a crane operator accidentally lifted the spacecraft's composite backshell with a 2,000-lb. aluminum table attached to it. The operator had traveled to Kennedy Space Center from JPL to help prepare the spacecraft for launch, and mistakenly hit the wrong switch on the crane controls. Web posted. (2011). [NASA Bets Big Rover On Novel Landing Scheme [Online]. Available WWW: http://www.aviationweek.com/ [2011, August 1].]

**August 2: NASA Eyes Juno Launch Friday & TS Emily**

A powerful Atlas V rocket is being prepped for the planned launch Friday of a $1.1 billion NASA mission to Jupiter, but mission managers will be keeping a close eye on Tropical Storm Emily in the Caribbean. The United Launch Alliance Atlas and its payload -- NASA's Juno spacecraft -- are slated to blast off from Launch Complex 41 at Cape Canaveral Air Force Station at 11:34 a.m. Friday. The launch window that day will extend until 12:43 p.m. Forecasters at the Air Force 45th Space Wing Weather Squadron say there is a 70 percent chance conditions will be acceptable for launch on Friday. However, Tropical Storm Emily is expected to strengthen and be in close proximity to central Florida by Saturday. Twenty- to 30-knot winds are expected along with an increasing chance of rain showers. There is a 60 percent chance weather would force a scrub on Saturday or Sunday. NASA's Juno spacecraft is to be launched on a five-year journey to Jupiter. The prime goal of the mission is to yield a better understanding of the origin and evolution of Jupiter, which is thought to be the first planet to form after the birth of the solar system 4.5 billion years ago. Web posted. (2011). [NASA Eyes Juno Launch Friday & TS Emily [Online]. Available WWW: http://www.floridatoday.com *the flame trench blog* [2011, August 2].]

**Get to know Juno's launcher: The Atlas 5 rocket**

This rocket's family name has been launching robotic explorers throughout the solar system for nearly 50 years, revolutionizing mankind's knowledge about the planets and our place in the Universe. From a Cape Canaveral launch pad Friday [August 5], the start of NASA's next planetary adventure begins with another Atlas rocket hurling a sophisticated probe away from Earth. Liftoff of the Juno spacecraft on its five-year journey to Jupiter is scheduled for 11:34 a.m. EDT (1534 GMT) aboard a United Launch Alliance Atlas 5. Towering 197 feet tall and generating two-and-a-half-million pounds of chest-thumping thrust, the vehicle will place the 7,995-pound satellite on its circuitous route to the king of planets. Atlas-Centaur rockets have been used since the 1960s to dispatch ground-breaking missions for NASA, including the Surveyors to the Moon, Mariner flights to Mars, Venus and Mercury, and the Pioneers that were the first to visit Jupiter and beyond. In its newest generation, the Atlas 5 rocket sent the Mars Reconnaissance Orbiter to the red planet in 2005, propelled the New Horizons probe toward Pluto and the solar system's outer fringes in 2006 and the doubled up with the dual Lunar Reconnaissance Orbiter and LCROSS impactor to the Moon in 2009. Atlas 5 represents the culmination of evolution stretching back several decades to America's first intercontinental ballistic missile. At the dawn of the space age, boosters named Atlas launched men into orbit during Project Mercury and became a frequent vehicle of choice to haul civil, military and commercial spacecraft to orbit. The rocket launching Juno was born of the Air Force's competition to develop next-generation Evolved Expendable Launch Vehicles. It has flown 26 times since debuting in 2002, carrying out nine commercial flights with communications spacecraft, eight dedicated to the Defense Department, five missions with spy satellites for the National Reconnaissance Office and four for NASA. Atlas 5 was built to be more robust and reliable over earlier Atlas and Titan heavy-lift vehicles, and streamlined production has resulted in fewer opportunities for human error. The new launcher builds upon the success of its predecessors, using the Russian-made RD-180 main engine, a stretched Centaur upper stage and its RL-10 engine that were proven during the Atlas 3 program. The

key piece that set Atlas 5 apart, however, was the rigid body Common Core Booster serving as the rocket's first stage. The CCB replaced the "balloon" pressure-stabilized stage used by previous Atlas vehicles. As the CCB's name suggests, the stage is common and is used in all the various configurations of the Atlas 5 family. The booster stage is 106.6 feet long and 12.5 feet diameter. There are three distinct versions of Atlas 5 rockets -- the 400 series, 500 series and Heavy -- each tailored to launching a certain class of satellite. The 400 series uses a four-meter diameter payload shroud and has flown 19 times. The 500 series, distinguished by a five-meter fairing, has launched 7 times. The proposed Heavy is a future Atlas 5 version that would take three Common Core Boosters to form a powerful triple-body rocket. To match an Atlas 5 with the size of its payload, up to five solid rocket motors can be strapped to the rocket to give extra boost at liftoff and the two different types of nose cones are available to enclose the satellite atop the launcher. The various options give Atlas 5 the nickname "dial-a-rocket" because of its flexibility. Juno will fly on the 551 configuration, the most powerful version of the Atlas 5 currently available. This translates to a rocket with the bulbous five-meter fairing, five solid rocket boosters and one RL-10 engine on the Centaur upper stage. The energetic version has been used only once in the previous 26 flights by the vehicle, launching the Pluto-bound probe New Horizons. Giving the rocket an added kick off the launch pad are five solid-propellant boosters made by Aerojet. Considered the world's longest monolithic -- or single-segment -- solid boosters, the motors provide the extra thrust needed to increase the Atlas 5's payload-carrying capacity. Each booster stands 67 feet tall, has a diameter of just over five feet and weighs 102,000 pounds at launch. The slender white rockets have a lightweight graphite epoxy casing with an erosion-resistant insulation. The solid fuel is high-performance class 1.3 HTPB propellant. Atop the booster is an aerodynamically-shaped graphite epoxy nose fairing. Each motor has forward and aft attachment structures to the Atlas 5's first stage. The motor nozzle is carbon-phenolic. The motor burns for 90 seconds, producing a maximum thrust of approximately 400,000 pounds and an average of 280,000 pounds. The Russian RD-180 first stage main engine can accomplish the entire job of steering the Atlas 5 during launch, thus the solid boosters feature simple, fixed nozzles. The Atlas 5 shrouds are the largest lightweight composite payload fairings ever built. For Atlas 5's 500-series, the fairings are about 17 feet in diameter. A "short" version, which will be used for Juno, is 68 feet long and weighs 7,800 pounds. Web posted. (2011). [Get to know Juno's launcher: The Atlas 5 rocket [Online]. Available WWW: http://www.spaceflightnow.com [2011, August 2].]

**Atlantis Final Mission Included Successful Kennedy Plant Experiment**

Atlantis carried many science and research experiments in its middeck during NASA's last shuttle flight, STS-135, in July. Among these was a plant experiment developed at Kennedy Space Center's Space Life Sciences Laboratory (SLSL) that could have an impact on long duration missions to the moon or Mars. Principal Investigators Dr. Gary Stutte and Dr. Michael Roberts with QinetiQ NA, and NASA Project Scientist Dr. Howard Levine created the Biological Research in Canisters-Symbiotic Nodulation in a Reduced Gravity Environment (BRIC-SyNRGE). A first of its kind to fly on a space shuttle, the purpose of the experiment was to study the symbiotic relationship between plants similar to alfalfa, which is in the legume family, and specific nitrogen-reacting bacteria in microgravity. "It's a distinct honor to have had an experiment onboard Atlantis, the final space shuttle mission, and I am indebted to everyone who worked so hard to make it possible to be a part of this historic mission," Stutte said. About four hours after Atlantis landed at Kennedy's Shuttle Landing Facility, the BRIC-SyNRGE experiment was retrieved and returned to the SLS Laboratory. Stutte said that initial reviews show that there was 100 percent germination of the plant seeds and excellent growth was observed. "The SyNRGE science team has begun processing the samples and looks forward to learning the effects of microgravity," Stutte said. "Plants and the microbial world have been of interest at Kennedy for many years." According to Stutte, the bacteria were introduced to each plant sample's root hairs in order to study the effect. What he and the SyNRGE team are hoping to find is that the plants have formed specialized nodules where the bacteria can convert atmospheric nitrogen into a form the plants can use to produce proteins. The alfalfa-like plant, Medicago truncatula, was grown in a plant chamber at the SLSL. The day before Atlantis' launch, several laboratory rooms were abuzz with activity. In one lab, samples were carefully harvested and

inserted into Petri dish units. In another lab, technicians added the nitrogen-fixing bacteria and a liquid preservative to the dishes. In yet another room, plant units were inserted into the canisters. A total of 120 Petri dishes were installed in eight canisters. Each canister contained five units and a temperature sensor. The experiment was transported to the launch pad and added to Atlantis middeck as a late stowage item the evening before launch. Stutte said this kind of study could provide a path for better food production, improve agricultural areas in third world countries, and reduce resupply costs for fertilizer. It could also have an impact on how food sources are grown during long duration space missions. "Legumes are a major direct source of food for man," Stutte said. "These include soybeans, peas and beans. Also, forage for livestock, including alfalfa and clover." During the STS-135 mission, crew members monitored the temperature of the BRIC-SyNRGE samples, added a fixing liquid to half of the samples to preserve them and left the other half untouched. "We hope that our results provide information on how synergistic relationships form between plants and bacteria, and that we use that knowledge to benefit food and fiber production on Earth," Stutte said. "We hope our research brings us closer to achieving sustainable life support systems that permit long term habitation and colonization of space." Levine said funding for the project was initiated in September of 2010 for the experiment to fly in July of 2011. "It takes an incredible amount of skill and effort on the part of both the science and engineering teams. They are all to be commended." Levine commented. Web posted. (2011). [Atlantis Final Mission Included Successful Kennedy-Developed Plant Experiment [Online]. Available WWW: http://www.space-travel.com [2011, August 2].]

**Columbia Debris Turns Up In East Texas**

NASA officials and local authorities believe a spherical tank discovered on the banks of an East Texas lake is debris from the shuttle Columbia, which disintegrated over the region during an ill-fated 2003 atmospheric reentry that killed seven astronauts. This photo distributed by the Associated Press via the Nacogdoches Police Department shows a four-foot diameter sphere. Low water levels at Lake Nacogdoches as a result of an ongoing drought led to the discovery and recovery of the tank. NASA officials say the object likely is a shuttle fuel cell system tank. Shuttle orbiters are equipped with three fuel cells that combine liquid hydrogen and liquid oxygen to generate electricity to operate spacecraft systems. Potable water is generated as a byproduct. The sphere likely is either a liquid oxygen or liquid hydrogen tank from the so-called Power Reactant Storage and Distribution (PRSD) system. Columbia and its crew were lost when hot gasses blowtorched through a hole in the shuttle's left wing during atmospheric reentry on Feb. 1, 2003. A 1.67-pound chunk of foam broke free from the shuttle's external tank during launch, punching a six- to 10-inch hole in the wing. The damage went undetected during a 16-day science mission. Web posted. (2011). [Columbia Debris Turns Up In East Texas [Online]. Available WWW: http://www.floridatoday.com *the flame trench blog* [2011, August 2].]

**Atlantis' payload bay emptied**

The final space shuttle payloads were removed from Atlantis' cargo bay Tuesday morning inside Kennedy Space Center's orbiter processing hangar. The Italian-made Raffaello logistics module and the failed ammonia coolant pump returned from the International Space Station during the July shuttle mission. Technicians spent about an hour carefully getting the heavy-duty lifting crane connected to the two payloads, then swiftly hoisted the elements out of Atlantis and over to the transportation canister parked inside the hangar. The 22,000-pound Raffaello made four trips to the space station to deliver equipment and supplies to the outpost. The Atlantis flight took 9,403 pounds of cargo to the outpost, then brought 5,666 pounds of trash and no-longer-needed items off the station for return to Earth. That 780-pound ammonia pump experienced some sort of electrical short on July 31, 2010, knocking out half of the space station's thermal cooling system. It was replaced during a series of three spacewalks performed last August by the Expedition 24 crew using a spare prepositioned aboard the station. NASA wanted to get this failed unit back on the ground so engineers can figure out what caused the malfunction. Web posted. (2011). [Photo Gallery: Atlantis' payload bay emptied [Online]. Available WWW: http://www.spaceflightnow.com [2011, August 2].]

**Atlantis Final Crew, NASA thank Shuttle Workforce with Tribute Banner**

Following the majestic predawn touchdown of Space Shuttle Atlantis at the Kennedy Space Center (KSC) to close out the Space Shuttle Era, the final crew of Atlantis, NASA Administrator Charles Bolden and KSC Director Bob Cabana thanked the Space Shuttle workforce for their dedication and hard work at an employee appreciation event held outside the processing hangers where the orbiters were prepared for the 135 shuttle missions flown by NASA over more than thirty years. The four person crew of Atlantis on the STS-135 mission flew a special commemorative banner millions of miles to the International Space Station and back in honor of the thousands of workers who processed, launched and landed America's five space shuttles. They unfurled the banner at the employee event at KSC in tribute to the shuttle workers. "It's great to be here in sunny Florida," said STS 135 Commander Chris Ferguson. "Mike Leinbach [the Space Shuttle Launch Director] said there was no way he'd let us land in California. We want to express our gratitude on behalf of the astronaut office for everything you have done here at KSC, the safety you have built into the vehicles, the meticulous care that you take of the orbiter. As soon as we got on orbit, I was absolutely amazed that everything in Atlantis works so well. Everything looks beautiful on the inside. I hope you all believe that every time we go, we take a little bit of every one of you with us," Ferguson emphasized. Atlantis was parked at the event as a backdrop for photo opportunities with the thousands of shuttle workers in attendance – along with over a hundred journalists including the Universe Today team of Alan Walters and Ken Kremer. "Like Chris said, our one landing option was getting back to Florida and you all rather than anywhere else. It felt like being home again. Thank you for everything you have all done over the last 30+ years," said Doug Hurley. "We treated Atlantis with the utmost respect because we see firsthand how you process this vehicle and it is your baby," said Rex Waldheim. "It is clean and well cared for. We did that for you because you all did such a great job preparing it for us." "You are such a special work force," added Sandy Magnus. "There is no workforce like the space program workforce anywhere in the world. The pride, care, dedication and passion you take in your work is what makes it possible to have these very challenging missions and to succeed. You have to do everything right all of the time. And you DO. And you make it look easy!! Congratulations!" The STS-135 crew then unfurled the colorful banner taken to the ISS aboard Atlantis to commemorate NASA's Space Shuttle Era. "We took this banner with us to space and this is our way of telling you that you guys rock ! We will present this to Mike Leinbach and Bob Cabana as just a small token of our appreciation for all the work you've done for us. Thank you for such a wonderful vehicle," Ferguson summed up. The crew then waved good bye to the thousands of shuttle workers, posed with Atlantis one last time and departed with their families for a homecoming celebration at their training base at the Johnson Space Center in Houston, Texas. Atlantis was then towed a few hundred yards (meters) and came to rest inside the Orbiter Processing Facility to conclude her final spaceflight journey as the last of NASA's flight worthy Space Shuttle Orbiters. She has begun decommissioning activities due to last several months to prepare for her future retirement home at the Kennedy Space Center Visitor Complex (KSCVC) just a few miles (km) away. Web posted. (2011). [Atlantis Final Crew and NASA thank Shuttle Workforce with space flown Tribute Banner [Online]. Available WWW: http://www.universetoday.com [2011, August 2].]

**August 3: Who Made Those NASA Logos?**

The return of the space shuttle Atlantis to the Earth's atmosphere two weeks ago marked the close of NASA's 30-year space shuttle program. Retirement of this popular and very visible shuttle program further strains the already diminished agency. "Space experts say the best and brightest often head for the doors when rocket lines get marked for extinction, dampening morale and creating hidden threats," according to The Times. This is not the first time in NASA's history when the agency faced publicity troubles. Back in 1974, after the success of the Mercury and Apollo programs, but before the initiation of the Shuttle Program, NASA was convinced by the National Endowment for the Arts to participate in its "Federal Graphics Improvement Program," and do what many companies these days do to revive their image: undergo a redesign. Up until that point, NASA had been primarily using an insignia adapted by

James Modarelli, the head of NASA's Lewis Research Center Reports Division. This logo, created in 1959 and affectionately dubbed "The Meatball," relied heavily on multiple visual metaphors. According to NASA Web site, "the sphere represents a planet, the stars represent space, the red chevron is a wing representing aeronautics (the latest design in hypersonic wings at the time the logo was developed), and then there is an orbiting spacecraft going around the wing." Although charming in its quirkiness, the meatball proved difficult to reproduce given the printing technology available at the time and the variety of applications it would need to adorn. Enter Richard Danne and Bruce Blackburn. They were hired to create, in Danne's words, "a more useful new Logotype." In a recently completed, yet to be published memoir, Danne describes the streamlined new design as "clean, progressive, could be read from a mile away, and was easy to use in all mediums." Danne and Blackburn replaced the complex meatball with a stripped-down, modernist interpretation where even the cross stroke of the A's were removed. During the first design presentation, the proposed system was met with some resistance. Danne remembers NASA's Administrator, Dr. James Fletcher, and Deputy Administrator, Dr. George Low, having the following exchange: Fletcher: "I'm simply not comfortable with those letters, something is missing." Low: "Well, yes, the cross stroke is gone from the letter A." Fletcher: "Yes, and that bothers me." Low: "Why?" Fletcher: (long pause) "I just don't feel we are getting our money's worth!" Still, the new program was approved and implemented. Seventeen years later, despite its winning the prestigious "Award of Design Excellence" by The Presidential Design Awards, NASA scrapped the Danne and Blackburn design and re-instated "The Meatball." Danne thinks this was at least partly due to how NASA chose to introduce the new logo to its various internal agencies in the first place. He says the redesign was kept secret until letters were set out to every center director … on their new stationery. Those loyal to the old design were offended, and a rivalry between "The Meatball" and the new design (unaffectionately dubbed "The Worm") began. Now that NASA finds itself in another downturn, I asked Danne if he thought NASA would commission another redesign. He didn't think that the budget would allow it, but "if they were to change image directions … they already have one very fine design program just waiting to be launched again." Web posted. (2011). [Who Made Those NASA Logos? [Online]. Available WWW: http://www.nytimes.com [2011, August 3].]

**KSC to host special Atlas V launch events**

The Kennedy Space Center Visitor Complex is offering special viewing opportunities for Friday's scheduled launch from Cape Canaveral Air Force Station of the Jupiter-bound Juno spacecraft aboard an Atlas V rocket. The first 2,000 guests to arrive at the complex on Friday will be invited to view the launch from the closest possible public viewing area, the Apollo/Saturn V Center. The visitor complex will open at 7 a.m. Additional launch viewing opportunities will be available at the Visitor Complex's Shuttle Plaza. Web posted. (2011). [KSC to host special Atlas V launch events [Online]. Available WWW: http://www.floridatoday.com [2011, August 3].]

**ATK lays of 100 in sixth cut in Utah over two years**

ATK Aerospace Systems told employees in June it would conduct another round of layoffs in its aerospace systems group. On Wednesday it followed through, cutting 100 in the wake of NASA's shutdown of the U.S. space shuttle program. ATK spokeswoman Trina Patterson said that among the number, 28 were volunteers and five were transferred to other divisions. "The reductions were primarily in Utah but also affected our Alabama and Florida locations," she said in an emailed statement. Web posted. (2011). [ATK lays of 100 in sixth cut in Utah over two years [Online]. Available WWW: http://www.sltrib.com [2011, August 3].]

**August 4: Adam's legislation**

Congress may be on summer recess now, but it's not entirely devoid of activity. Yesterday Rep. Sandy Adams (R-FL) announced Wednesday she has introduced legislation to support a local economy facing thousands of layoffs with the retirement of the Space Shuttle. The "Shuttle Workforce Revitalization Act of 2011", HR 2712, would designate all of Brevard County, Florida (home of the Kennedy Space Center),

as a Historically Underutilized Business Zone (HUBZone), giving businesses there preferential treatment for some federal contracts. The legislation, she notes in the release, would give local businesses a "competitive edge" in federal procurements and "will not cost the federal government a single additional dollar, nor does it authorize or appropriate any additional funding." Rep. Bill Posey (R-FL) said in the release that he supports the Adams bill, although he has not signed up yet as a co-sponsor. Web posted. (2011). [Briefly: Adams's legislation, Wu's resignation [Online]. Available WWW: http://www.spacepolitics.com [2011, August 4].]

**Boeing selects Atlas 5 rocket for initial CST-100 test flights**

Boeing will use United Launch Alliance Atlas 5 rockets for initial test flights of the company's proposed CST-100 manned spacecraft, a seven-seat capsule being developed for commercial missions to and from government and private-sector space stations in low-Earth orbit, company officials announced Thursday. John Elbon, vice president and program manager of Boeing commercial crew transportation systems, said four test flights of the CST-100 spacecraft are envisioned, assuming continued NASA funding, including an on-the-launch-pad abort test in 2014 that will not require a booster. The other three flights will use a version of the Atlas 5 that includes one solid-fuel strap-on booster and a two-engine Centaur upper stage: * An unmanned CST-100 orbital test flight in the first quarter of 2015. *An unmanned in-flight test of the CST-100 abort system in the middle of the year. *A manned test flight with two Boeing pilots on board in the fourth quarter. The agreement announced Thursday includes development of launch pad crew access and emergency egress systems and an avionics system to detect faults in the Atlas 5 in time to trigger the capsule's abort system. If funded, the rockets will be launched from complex 41 at the Cape Canaveral Air Force Station. The Atlas family rockets boasts 97 successful launchings in a row while the Atlas 5 family has logged 26 successes and no failures. It is certified to carry high-priority national security spy satellites as well as nuclear-powered science missions like NASA's upcoming Mars Science Laboratory. Web posted. (2011). [Boeing selects Atlas 5 rocket for initial CST-100 test flights [Online]. Available WWW: http://www.spacepolitics.com [2011, August 4].]

**Atlas 'Go' To Roll Out For Friday Launch**

NASA just gave United Launch Alliance a green light to move a powerful Atlas rocket out to its oceanside launch pad, setting the stage for the planned launch Friday of the Juno spacecraft and a six-year sojourn to Jupiter. The 197-foot rocket and the Juno spacecraft are scheduled to blast off from Launch Complex 41 at Cape Canaveral Air Force Station at 11:34 a.m. Friday. The launch window that day will extend through 12:43 p.m. The weather forecast calls for a 70 percent chance of acceptable weather. The Atlas and its payload should reach the pad surface at complex 41 about 10 a.m. today. The rollout is scheduled to begin at the top of the hour. Launch managers still are keeping a close eye on Tropical Storm Emily, which now is meandering just south of Hispaniola and is expected to resume a west-northwest track later this morning. The storm is expected to be out over the Atlantic Ocean due east of Cape Canaveral early Sunday. Web posted. (2011). [Atlas 'Go' To Roll Out For Friday Launch [Online]. Available WWW: http://www.floridatoday.com *the flame trench blog* [2011, August 4].]

**ULA Plans Fix For Delta IV Heavy Launch Flame**

United Launch Alliance and Pratt & Whitney Rocketdyne (PWR) are developing short- and longer-term solutions to prevent the cloud of burning hydrogen that envelopes the base of the Delta IV Heavy during liftoff. Seconds before launch, thousands of pounds of hydrogen are dumped through the three PWR RS-68 Common Core Booster first-stage engines to optimize their hydrogen/oxygen mix for ignition. Excess gas is deliberately burned off by radial, outwardly firing igniters or spark generators, prior to ignition. However, due to the large volume of hydrogen and possibly the configuration of the vehicle and its relatively slow initial ascent profile, some gas burns in pockets of flame that remain close to the booster as it clears the launch tower. Although described as a harmless side effect of the standard launch procedure, the burn-off phenomenon has garnered attention and initially will be solved by igniting one of the three RS-68s slightly earlier than the others prior to liftoff. In the longer term, further design changes

are planned, including alterations to the timing of the valves in the hydrogen system and alternate chill-down methods using cooled helium. Web posted. (2011). [ULA Plans Fix For Delta IV Heavy Launch Flame [Online]. Available WWW: http://www.spacepolitics.com [2011, August 4].]

**August 5: More Than 1,000 Shuttle Workers To Lose Jobs This Month**

More than 1,000 workers at companies that worked on the space shuttle program will leave their jobs for good in August. While at least one major space shuttle contractor is laying off more employees than it projected in the lead up to last month's final space shuttle mission, at least two — Houston-based United Space Alliance (USA) and Chicago-based Boeing — will issue fewer pink slips in August than initially predicted. The most significant attrition is at USA, NASA's main shuttle contractor. The Boeing-Lockheed Martin joint venture expects to end the summer with a work force less than a third the size it was following the 2003 Space Shuttle Columbia accident. USA, which laid off 1,550 workers immediately following the final space shuttle mission's July 21 landing at Kennedy Space Center in Florida, will lay off another 515 Aug. 12, spokeswoman Kari Fluegel told Space News Aug. 3. Most of these will come out of Houston. "On the 12th of August, that's going to be our biggest layoff in Texas," Fluegel said. USA expects to lay off approximately 285 more employees in Houston, Huntsville, Ala., and Huntington Beach, Calif., by the end of August, leaving a company that once employed 10,500 with just over 3,100 employees. USA had notified nearly 2,900 employees in mid-May that they would be laid off between late July and the end of August. Some of the notified employees, however, either found new positions within the company or left USA ahead of the layoffs, Fluegel said. USA's parent companies, Boeing and Lockheed, also plan to lay off more shuttle workers in August, representatives of both companies said. According to WARN notices filed by Pratt & Whitney Rocketdyne with Florida, 67 employees at the Kennedy Space Center are to be laid off between July 29 and Dec. 15. Web posted. (2011). More Than 1,000 Shuttle Workers To Lose Jobs This Month, Including 800 from USA [Online]. Available WWW: http://www.spacenews.com [2011, August 5].]

**Hammerhead topples at old Titan site**

Earlier this week, workers on south Vandenberg Air Force Base removed the hammerhead portion of Space Launch Complex-4 East, the former Titan 4 rocket launch facility that is visible from around the Lompoc Valley. The demolition of the historic launch facility is taking place to make way for the new Falcon 9 Heavy rocket manufactured by Hawthorne-based Space Exploration Technologies. It's not the first time SLC-4 East has undergone modifications since construction originally began in 1961 to ready the site to launch the Atlas/Agena space booster. The first Atlas/Agena rocket first flew from SLC-4E in 1964. Later, the site was used for the Titan 3D, Titan 34D and Titan 4 rockets. Web posted. (2011). [Hammerhead topples at old Titan site [Online]. Available WWW: http://www.lompocrecord.com [2011, August 5].]

**Juno spacecraft leaves Earth for its journey to Jupiter**

A powerful United Launch Alliance Atlas 5 rocket roared to life Friday and launched NASA's solar-powered Juno space probe on a five-year voyage to Jupiter, the first step in a $1.1 billion mission to look for clues about the origins of the solar system in the hidden heart of its largest planet. The towering 197-foot-tall Atlas 5, equipped with five solid-fuel strap-on boosters for extra power, ignited with a ground-shaking roar at 12:25 p.m. EDT (GMT-4), generating 2.5 million pounds of thrust and instantly pushing the spacecraft away from launch complex 41 at the Cape Canaveral Air Force Station. It was only the second launch of a five strap-on Atlas 5, the most powerful version offered by United Launch Alliance. Liftoff was delayed 51 minutes to resolve two technical issues and to make sure the launch danger zone was clear. Climbing away atop a brilliant plume of fiery exhaust, the rocket accelerated through the sound barrier 34 seconds after liftoff, arcing away to the East and putting on a spectacular lunchtime show for tourists and area residents. The strap-on boosters burned out and peeled off about a minute later and the first stage shut down and fell away as planned four-and-a-half minutes after launch. The rocket's hydrogen-fueled Centaur upper stage then carried out a six-minute burn to boost the spacecraft into a

temporary parking orbit. A second nine-minute Centaur firing 31 minutes later accelerated Juno to 25,000 mph, or 7 miles per second -- interplanetary escape velocity -- and three minutes later, the 4-ton spacecraft separated from the Centaur to fly on its own. Juno's three solar panels then unfolded and initial checks showed the spacecraft came through launch in good shape and pointed in the right direction. Web posted. (2011). [Juno spacecraft leaves Earth for its journey to Jupiter [Online]. Available WWW: http://www.spaceflightnow.com [2011, August 5].]

**45th Space Wing Supports Successful Atlas V Juno Launch**

The U.S. Air Force's 45th Space Wing provided flawless Eastern Range support for the successful launch of the United Launch Alliance Atlas V rocket with NASA's Juno spacecraft today. The launch occurred at 12:25 p.m. (EDT) from Space Launch Complex 41. A combined team of military, government civilians and contractors from across the 45th Space Wing provided vital support to the Juno launch, including weather forecasts, launch and range operations, safety and public affairs. The wing also provided its vast network of radar, telemetry, optical and communications instrumentation to facilitate a safe launch on the Eastern Range. Built by Lockheed Martin, Juno will investigate Jupiter's formation, evolution and structure from an elliptical orbit. The Atlas V rocket flew in the 551 vehicle configuration with a five-meter fairing, five solid rocket boosters and a single-engine Centaur upper stage. "As always, the 45th Space Wing is pleased to have supported NASA on another successful and safe launch," said Brig. Gen. Ed Wilson, commander, 45th Space Wing. Web posted. (2011). [45th Space Wing Supports Successful Atlas V Juno Launch [Online]. Available WWW: http://www.patrick.af.mil [2011, August 5].]

**August 6: KSC Visitor Complex explores options for visitors**

Atlantis will be the main new attraction, but there will be a strong supporting cast of new exhibits and features at the Kennedy Space Center Visitor Complex in the coming years. Improvements there will include moving the U.S. Astronaut Hall of Fame to the main visitor complex campus, a possible bus tour stop at the Vehicle Assembly Building, more interactivity as people wait in line for bus tours, and revamping the complex so there is an imaginary "vapor trail" leading visitors from one exhibit to the next. Details on a spectrum of the visitor complex upgrades are beginning to emerge, while work continues to prepare retired shuttle Atlantis for display in a new 66,000-square-foot building that will be constructed there. The visitor complex is Brevard County's most popular paid tourist attraction, drawing about 1.5 million visitors a year. Visitor complex spokeswoman Andrea Farmer said complex operator Delaware North Companies Parks & Resorts is working with NASA on the logistics of having the iconic 525-foot-tall Vehicle Assembly Building become part of a specialized tour of the space center. The VAB originally was built for assembly of Apollo/Saturn vehicles and later was modified to support the shuttle program. It has been off-limits to the general public for several years. "We're exploring what can be possible," Farmer said. That includes looking for other areas of KSC that have never been toured or haven't been toured in recent years. Visitor complex Chief Operating Officer Bill Moore said, while the centerpiece of the complex's 10-year master plan will be the Atlantis exhibit, other aspects of the plan also will create excitement at the facility. Among the plans for the visitor complex, Moore said: * Relocate the displays currently housed at the Astronaut Hall of Fame to the main visitor complex to offer the experience to more people. The Hall of Fame now is located about 6 miles to the west, near U.S. 1. By combining the two attractions at one location, the idea is to boost visitor totals at the Hall of Fame. Both attractions are operated by Delaware North, and Hall of Fame admission is included in the cost of a visitor complex ticket. What will happen to the current Hall of Fame building is still to be decided. * Build a new entry plaza that will bring visitors into the rocket garden area. Create a more sensible traffic flow pattern, leading from the new complex entrance through other exhibits, and winding up at the new Atlantis exhibit and Shuttle Launch Experience simulator. *Provide more of an "experience" while waiting on the sometimes long lines leading to the bus tour boarding area, possibly including "a live interpreter sharing stories and visuals of the working space center, building anticipation for the tour guests are about to embark on." *Make the tour buses themselves more visually pleasing, with space-themed graphics. *Add new water features. * Upgrade the food, beverage and retail offerings at the visitor

complex. The Atlantis exhibit itself will cost Delaware North $100 million, including the cost to acquire the orbiter and construction costs for the still-unnamed exhibit building. The exhibit is due to open by the summer of 2013. Web posted. (2011). [KSC Visitor Complex explores options for visitors [Online]. Available WWW: http://www.floridatoday.com [2011, August 6].]

**August 8: ULA Nears Agreement for 2013 Hosted Small Satellite Launch**

United Launch Alliance (ULA) engineers who have worked for years to develop a suite of hardware to send small satellites into orbit on Atlas 5 rockets and Delta 4 launchers are close to finalizing an agreement to include the first batch of small satellites on a commercial mission in 2013. Although some relevant contracts have not yet been signed, the preliminary plan calls for nine small satellites to launch in 2013 on a Lockheed Commercial Launch Services Atlas 5 rocket, said Jake Szatkowski, small satellite project manager for United Launch Alliance. He declined to identify the primary mission for that Atlas rocket or the small satellites expected to accompany it, saying only that the group of secondary payloads is likely to include spacecraft built by commercial and government customers. Szatkowski, who presented details on ULA's ridesharing program July 28 at the NewSpace 2011 conference here, said the deal "will open a new low-cost secondary launch capability for small- to medium-class satellites." The 2013 Atlas 5 mission expected to include secondary payloads is slated to carry eight satellites weighing approximately 10 kilograms apiece and a single 180-kilogram spacecraft, Szatkowski said. Each of the 10-kilogram satellites will be housed in a canister called a Poly Picosatellite Orbital Deployer, or P-POD, a spring-loaded device developed at the California Polytechnic State University in San Luis Obispo. All eight P-PODs will be housed in a payload adapter developed at the Naval Postgraduate School in Monterey, Calif. The Naval Postgraduate School CubeSat Launcher is designed to fit multiple P-PODs into one slot of an Evolved Expendable Launch Vehicle Secondary Payload Adapter, a device developed by the U.S. Air Force Research Laboratory to deploy six small satellites on Atlas 5 and Delta 4 rockets. Many additional types of ridesharing opportunities for secondary payloads are on the horizon, Szatkowski said. While ULA typically launches Atlas and Delta rockets into low Earth orbit or geostationary orbit, company engineers have developed an electric, third-stage motor designed to send small spacecraft far from the primary payload's destination. The third-stage motor could propel small satellites on Earth escape trajectories toward the Moon, near-Earth objects or Mars. Szatkowski said that capability may be attractive to teams competing for $30 million in awards as part of the Google Lunar X Prize, a race to send the first commercial spacecraft to the Moon. ULA's rideshare program is designed to offer low-cost launch opportunities for small satellites. Customers who send small satellites into orbit on government missions typically will pay only the additional cost incurred to integrate their payload onto the launch vehicle, Szatkowski said. Company officials also are striving to keep costs low for secondary payloads sent into orbit on commercial missions. It will cost ULA roughly $2 million to place nine additional payloads on the 2013 Atlas flight, he added. ULA plans to offer several different types of ridesharing opportunities in the next few years on both commercial and government missions. As part of a NASA mission scheduled for launch in approximately a year-and-a-half, ULA will give customers a chance to send a 2,270-kilogram satellite into orbit inside a 4-meter Atlas 5 or Delta 4, Szatkowski said. ULA has previously flagged NASA's upcoming launches of the Landsat Data Continuity Mission and its newest Tracking and Data Relay Satellite System spacecraft as good rideshare opportunities. Web posted. (2011). [ULA Nears Agreement for 2013 Hosted Small Satellite Launch [Online]. Available WWW: http://www.spacenews.com [2011, August 8].]

**A Shuttle Orbiter Curatorial Policy Recommendation**

In a recent National Public Radio interview, former NASA space shuttle program director Wayne Hale was asked what the shuttle program's most important lesson had been. Without hesitation, he replied "safety." Certainly among the most important safety lessons taught during space shuttle operations is the vulnerability of the orbiter's thermal protection system (TPS) to debris impacts. Damage from such an impact was determined to be the root cause of orbiter Columbia's destruction, and the loss of its seven-person crew, during hypersonic atmospheric entry Feb. 1, 2003. Debris impacts to orbiter TPS pose

relatively little safety risk when incurred on the runway as a mission ends. But damage from these and all other impacts accumulated during that mission requires expensive and time-consuming repair before the orbiter launches again. If the orbiter lands in California and is to be ferried piggyback atop a Boeing 747 to Florida, TPS damage must first be treated with a clear sealant to prevent additional damage from airflow erosion. With this history in mind, arguably the most compelling story a decommissioned orbiter can relate when displayed to the public is told by TPS damage incurred during its final flight. This damage should be rendered safe for public viewing, likely by a sealant akin to that used for ferry flights, but it should be otherwise faithfully preserved. The only TPS damage subject to repair after a final flight should be any arising from deservicing and other postflight activity required by NASA as part of an orbiter's decommissioning. Three institutions have been granted an orbiter with flown space mission history for display: Discovery to the National Air and Space Museum's exhibit near Washington, Atlantis to the Kennedy Space Center Visitor Complex, and Endeavour to the California Science Center in Los Angeles. These institutions are urged to adopt in-flight TPS damage preservation as a curatorial policy. From the heroic operational measures outlined here, such preservation is the only responsible course to take from the standpoint of exhibiting aerospace history to our progeny with minimal distortion. The message conveyed is that humanity's first attempts to operate with a reusable TPS to and from low Earth orbit typically incurred this degree of damage during just one flight. Future aerospace technologists will be far better informed by viewing such damage firsthand than by reading secondhand reports. Web posted. (2011). [A Shuttle Orbiter Curatorial Policy Recommendation [Online]. Available WWW: http://www.spacenews.com [2011, August 8].]

**Orbiters prepare for nose-to-nose meeting**

Two shuttle orbiters are getting ready for a face-to-face meeting this week at Kennedy Space Center. Normally sequestered in private hangars, Discovery and Endeavour on Wednesday morning will be moved from one facility to another and pass each other on the way. They'll pause for a nose-to-nose photo opportunity outside Discovery's former hangar, called Orbiter Processing Facility-3. The shuttle program has released OPF-3 for potential use by a commercial space company. So with only two hangars available for three orbiters, they're each taking turns occupying OPF-1, OPF-2 and an empty high bay in the Vehicle Assembly Building. After a month's stay in the VAB, Discovery is returning to OPF-1 for more work that will get it ready for display at the Smithsonian Institution, where it is expected to be ferried in April. Endeavour, after undergoing standard post-flight safing and inspections in OPF-1, will take Discovery's place in the assembly building until October, when it will swap with Atlantis, now in OPF-2. Endeavour will later be ferried to the California Science Center; Atlantis will be displayed by the KSC Visitor Complex. Web posted. (2011). [Orbiters prepare for nose-to-nose meeting [Online]. Available WWW: http://www.floridatoday.com *the flame trench blog* [2011, August 8].]

**NASA Announces NIAC Winners**

NASA announced the 30 winners of Phase 1 awards intended to spur revolutionary space technologies through the NASA Innovative Advanced Concepts (NIAC) program today. Each winner gets $100,000 for one year to better define its concept, with the potential for a Phase 2 award in the future. Phase 2 awards would be for two more years, funded at $500,000. Hundreds of proposals were submitted according to Joe Parrish, director of the early stage innovation division in NASA's Office of Chief Technologist (OCT). A peer review process was used to select the winners. NASA hopes to make the competition annual, dependent on budget decisions in Congress. Winners from Kennedy Space Center included Michael Hogue – Regolith Derived Heat Shield for a Planetary Body Entry and Descent System with In-Situ Fabrication, and Laurent Sibille – In-Space Propulsion Engine Architecture based on Sublimation of Planetary Resources: from exploration robots to NEO mitigation. Web posted. (2011). [NASA Announces NIAC Winners [Online]. Available WWW: http://www.spacepolicyonline.com [2011, August 8].]

**August 9:** **NASA Selects Seven Suborbital Launch Providers**

NASA announced today the seven winners of contracts to fly NASA payloads on suborbital missions. The two-year indefinite delivery-indefinite quantity (IDIQ) contracts are worth a combined total of $10 million according to the press release. The payloads would be for technology development. NASA's Chief Technologist, Bobby Braun, said they would open up opportunities for engineers, scientists and technologists to mature technologies for application to future NASA missions. The seven winners are: Armadillo Aerospace; Near Space Corp; Masten Space Systems; Up Aerospace, Inc.; Virgin Galactic; Whittinghill Aerospace, LLC; XCOR. Web posted. (2011). [NASA Selects Seven Suborbital Launch Providers [Online]. Available WWW: http://www.spacepolicyonline.com [2011, August 9].]

**NASA IG Sizes Up Aging Infrastructure**

NASA Inspector General Paul K. Martin reports significant lapses in the agency's Real Property Management System (RPMS), an internal database that tracks the agency's significant and far-flung assets — an estimated 5,000 buildings and structures, including laboratories, launch pads and test stands. In total, these properties carry an impressive current replacement value of $26.4 billion — at a time NASA and the agency's legislative backers are in search of the financial means to fund future human as well as robotic exploration initiatives. Congress and the White House acknowledged as much when the NASA Authorization Act of 2010 was passed and signed into law. One provision of the legislation, which appears to represent the closest example of a policy consensus on NASA's post-shuttle future, includes a directive that the agency examine its property rolls and downsize to match the needs of future missions. As Martin notes in an Aug. 4 report, "NASA Infrastructure and Facilities: Assessment of Data Used to Manage Real Property Assets," 80% of these structures are at least 40 years old and in degraded condition. NASA's "aging issue" is peaking at a time when large and growing federal budget deficits are straining resources, especially for discretionary agencies like NASA, the report states. In a 2010 fiscal year audit, NASA's Inspector General found the RPMS out of date or lacking in information on facility utilization, mission dependence and condition — primary criteria that would drive strategic agency decisions on whether to maintain, repair, lease or sell properties that fall outside the agency's critical path. The audit included 34 facilities at Kennedy Space Center, Fla., Glenn Research Center, Ohio, and Marshall Space Flight Center, Ala. Web posted. (2011). [NASA IG Sizes Up Aging Infrastructure [Online]. Available WWW: http://www.aviationweek.com [2011, August 9].]

**August 10: Weather delays shuffle of retired space shuttles**

Stormy weather moving into the Kennedy Space Center has forced NASA to postpone today's relocation of the shuttles Endeavour and Discovery until tomorrow. The shuttle Endeavour, now deconfigured from her final spaceflight in May, will be rolled out of the hangar around 7:30 a.m. EDT tomorrow and enter temporary storage at the Vehicle Assembly Building. Sistership Discovery, which has been parked in the VAB for the past month, will be towed to the open hangar bay to resume museum display preparations. A brief photo opportunity of the two spacecraft nose-to-nose will occur during the transfer. With three orbiters and only two hangars available these days, NASA must periodically shuffle the shuttles around. Web posted. (2011). [Weather delays shuffle of retired space shuttles [Online]. Available WWW: http://www.spaceflightnow.com [2011, August 10].]

**Employees Rank NASA, NRC as Most Innovative Agencies**

More than half of federal workers value creativity and innovation in their jobs, according to a new report from a nonprofit organization. The Partnership for Public Service and the Hay Group, a global management consulting firm, looked at the factors driving innovation in agencies and found 63.3 percent of employees gave the government a positive score on innovation. The percentage was based on the average of three innovation-related questions posed in the Office of Personnel Management's annual survey of federal employee attitudes. The 2010 survey included more than 263,000 employees from 32 large agencies, 34 small agencies and 224 agency subcomponents. NASA and the Nuclear Regulatory Commission topped the list of most innovative agencies, according to the report. The General Services Administration, State Department, and Army rounded out the top five agencies. Employees ranked the

Securities and Exchange Commission last for innovation on the list of 28 agencies included in the snapshot. NASA and NRC were also on the Partnership's 2012 Best Places to Work list. Web posted. (2011). [Employees Rank NASA, NRC as Most Innovative Agencies [Online]. Available WWW: http://www.nationaljournal.com [2011, August 10].]

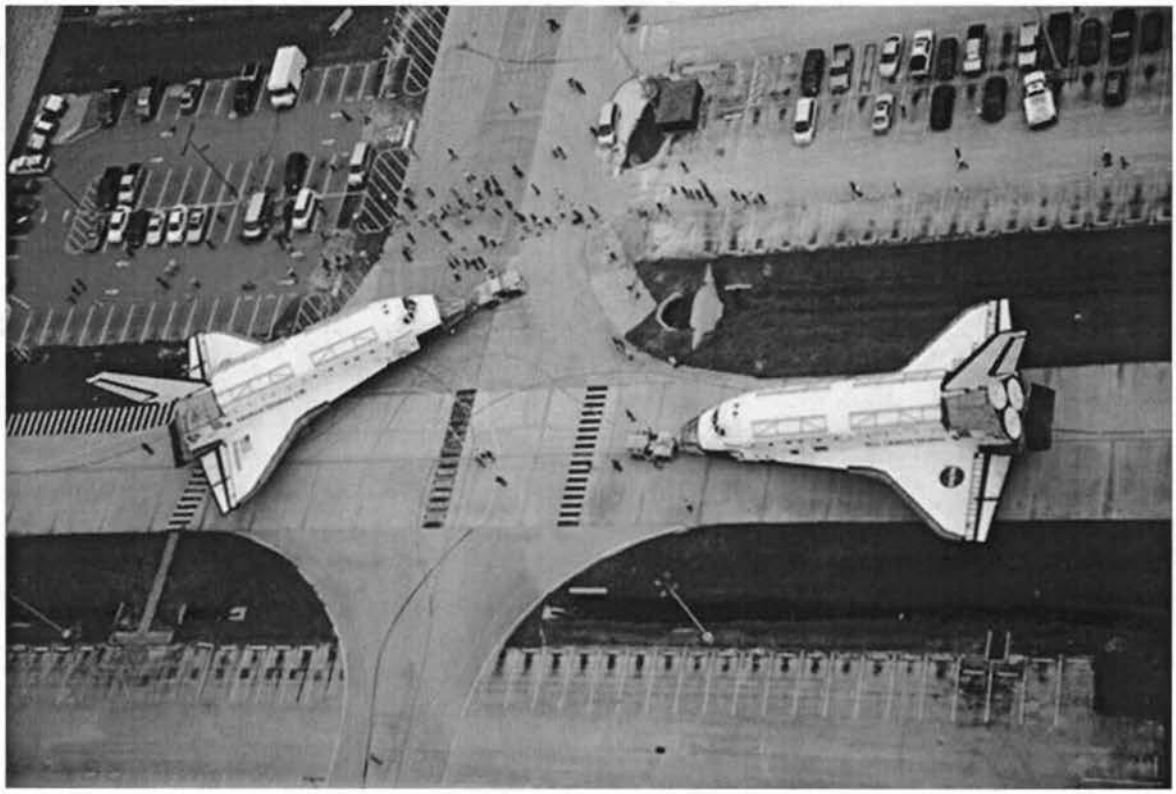
**August 11: State vows $7M expansion boost for SpaceX in Brevard**

The state has pledged more than $7 million to help SpaceX increase its local launch rate and potentially attract hundreds of jobs to the Space Coast. Hawthorne, Calif.-based SpaceX plans to renovate one facility and build another at Cape Canaveral Air Force Station so the company can process multiple Falcon 9 rockets and ready spacecraft for launch. "Having extra processing facilities for launch vehicles and payloads enables us to increase our launch rate," said SpaceX spokesman Bobby Block. "The greater the launch rate, the more activity you have out at the Cape." The Falcon 9 made its first two launches last year, including a demonstration mission under a NASA program preparing for deliveries of cargo to the International Space Station. Another demonstration for NASA is planned late this year. The company currently has 20 launches from the Cape under contract, including 13 for NASA, and hopes to launch from there monthly starting in 2015. Space Florida, the economic development agency charged with growing the state's aerospace industry, has not publicly identified SpaceX as its partner in the projects. The agency's board in June approved up to $2.3 million through next year to help renovate and expand a Cape facility. SpaceX is adapting Hangar AO -- a former Delta II facility that the company now calls Hangar X -- to process up to two rockets in addition to one at the Falcon 9 pad at Launch Complex 40. More recently, a newly comprised Space Florida board approved committing another $5 million toward what the agency called a "major construction project" designed to receive, encapsulate and integrate payloads onto rockets. The funding is expected to come from the state Department of Transportation, whose budget includes $16 million for spaceport infrastructure improvements. Construction could be complete within a year. Web posted. (2011). [State vows $7M expansion boost for SpaceX in Brevard [Online]. Available WWW: http://www.floridatoday.com [2011, August 11].]

**Deal that may bring 600 jobs to KSC could get OK soon**

Kennedy Space Center Director Robert Cabana said he is optimistic a deal will close soon to transfer control of a former shuttle hangar to Space Florida. He said that will clear up red tape, and enable what he described as "a commercial company" to move into the building known as Orbiter Processing Facility Bay 3, where it hopes to employ 500 to 600 people. Cabana provided that nugget of good news during a speech Wednesday to more than 100 members of the Titusville Area Chamber of Commerce. In an interview after the chamber luncheon, Cabana declined to disclose the company's identity. But The Boeing Co. confirmed in July that it is in negotiations with NASA and Space Florida, the state's aerospace economic development agency, to build a commercial space taxi in a former shuttle hangar at KSC. During his presentation, Cabana conceded that the local space industry is going through tough times following the end of the space shuttle program, as the combined local work force of NASA and space-industry contractors has dropped to about 8,200 from a peak of about 18,000. "We have challenges in front of us," said Cabana, a former astronaut who flew on four shuttle missions -- two as pilot, then two as commander. But he assured the audience at Dixie Crossroads Seafood Restaurant that things will get better, partly as a result of increased commercial space activity on the Space Coast. He said he expects the combined work force to reach 10,000 in about three years. "I want to guarantee you that Kennedy Space Center is not shutting," Cabana said, a comment that generated applause. "I promise you we are going to get through this." Reflecting on the end of the shuttle program, Cabana said, "We have to accept it. It's time to move on now. What was, was. We can't do anything about it. We have to evolve." By partnering with commercial space companies in efforts to continue operations of the International Space Station through at least 2020, Cabana said, NASA will be able continue its mission, even though "the budget constraints are huge" and "we're going to have to tighten our belts." "If we work together, we are going to be OK," Cabana said. And, by freeing NASA to look beyond low-Earth-orbit projects, Cabana added, he is confident the space agency will be able to "focus on the really tough job of taking us beyond Earth," to

destinations like the moon and Mars. Web posted. (2011). [Deal that may bring 600 jobs to KSC could get OK soon [Online]. Available WWW: http://www.floridatoday.com [2011, August 11].]



**Shuttle swap spawns nose-to-nose showdown**

Two space shuttle orbiters swapped places at the Kennedy Space Center on Thursday as NASA prepares the retired spaceships for public display in museums. The shuttle Endeavour backed out of its processing hangar as Discovery was towed from its storage location inside the mammoth Vehicle Assembly Building. The orbiters were briefly seen together on the tow road between the processing facilities and the VAB. After keeping Discovery inside the VAB since mid-July, workers will renew their focus on NASA's shuttle fleet leader and get it ready to depart the space center next spring bound for the Smithsonian's National Air and Space Museum's Steven F. Udvar-Hazy Center in suburban Washington. Endeavour will take a break from retirement preparations as Atlantis continues safing activities following ts return from the last space shuttle flight in July. Web posted. (2011). [Shuttle swap spawns nose-to-nose showdown [Online]. Available WWW: http://www.spaceflightnow.com [2011, August 11].]

**August 12: NASA Unveils New Batch Of Space Shuttle Program Artifacts**

The final space shuttle landing July 21 opened new prospects for eligible education institutions, museums and other organizations to receive a piece of spaceflight history. On Monday, Aug. 15, the eighth batch of artifacts from NASA's space programs will be available on a website that the agency and the General Services Administration (GSA) developed. The artifacts are not only from the shuttle era, but also from the Apollo, Mercury, Hubble Space Telescope programs. The approximately 2,000 items include: -- the Scott Carpenter Space Analog Station, an underwater habitat that was used to demonstrate space life support system ideas for use on space stations -- shuttle heat shield tiles used to test problems experienced during missions -- parts of Apollo and shuttle era spacesuits, including hard upper torso garments to protect astronauts from extreme temperatures. Each artifact will be available for 42 days. For the first 21 days, internal organizations such as NASA visitor centers, agency exhibit managers and the Smithsonian Institution may request artifacts. External organizations, including museums, schools, universities,

libraries, and planetariums may request artifacts during the following 21 days. After the screening period and completion of the request process, organizations will be notified about the status of their application. Artifacts are released incrementally when NASA no longer needs them, in accordance with export control laws and regulations. They are provided free of charge, but requesting organizations must pay for shipping and any special handling costs. To date, approximately 29,000 items of historic significance have been offered, mainly from the shuttle, with contributions from the Hubble, Apollo, Mercury, Gemini, and International Space Station programs. Approximately 3,000 artifacts have been requested. The remainder will be considered for federal and state reuse and then offered to the general public for sale. Web posted. (2011). [NASA Unveils New Batch Of Space Shuttle Program Artifacts [Online]. Available WWW: http://www.spaceref.com [2011, August 12].]

**NASA combined exploration, operations divisions**

NASA announced Friday it has merged directorates within the agency responsible for exploration and human spaceflight operations into a single entity. The Human Exploration and Operations (HEO) Mission Directorate combined the Exploration Systems Mission Directorate and the Space Operations Mission Directorate into a single organization. Space operations had been responsible for operations of the space shuttle, ISS, and related programs, while the exploration directorate had been responsible for the Constellation program and, after its cancellation, the MPCV capsule and SLS heavy-lift rocket. Bill Gerstenmaier, who had led the space operations directorate, will lead the new HEO directorate. Web posted. (2011). [NASA combined exploration, operations divisions [Online]. Available WWW: http://www.spacetoday.net [2011, August 12].]

**Twin lunar spacecraft prepared for launch from Cape Canaveral**

Twin moon-bound NASA spacecraft will move to a launch pad early next week, setting the stage for the final Delta II rocket launch from Cape Canaveral Air Force Station. Now at the Astrotech Space Operations processing facility in south Titusville, the spacecraft are slated to launch 8:37 a.m. Sept. 8 on a $496 million moon-mapping mission. Flying in formation in lunar orbit, the spacecraft will produce a high-quality map of the moon's gravity field and determine the structure of its interior from crust to core. NASA Program Manager David Lehman of the Jet Propulsion Laboratory in Pasadena, Calif., said the spacecraft are identical. "They are mirror images of each other," said Sami Asmar, NASA's project scientist at JPL. The two spacecraft are known by the NASA acronym GRAIL, which stands for Gravity Recovery and Interior Laboratory. They will launch side by side on a United Launch Alliance Delta II Heavy rocket at Cape Canaveral's Launch Complex 17B. About 150 Delta II rockets have launched from Cape Canaveral and Vandenberg Air Force Base in California. The first Delta II launch was Feb. 14, 1989. United Launch Alliance still has about five Delta II rockets at a manufacturing plant in Alabama. But the Sept. 8 launch is the last Delta II rocket currently scheduled to fly from Cape Canaveral. The launch also is the last scheduled at Launch Complex 17. The spacecraft are scheduled to arrive early Tuesday. Web posted. (2011). [Twin lunar spacecraft prepared for launch from Cape Canaveral [Online]. Available WWW: http://www.floridatoday.com [2011, August 12].]

**NASA readies Mars rover for launch**

The world's biggest, most expensive and most scientifically capable Mars rover is being pieced together at Kennedy Space Center on Saturday as NASA gears up for a high-stakes launch in late November. Planetary scientists involved in the $2.5 billion Mars Science Laboratory project are anxious to get the eight-month journey to the red planet under way. "We've led the charge to get the 10 (science) instruments onboard, and we're ready to go to Mars," NASA science payload manager Jeff Simmonds said Friday. The five-ton mobile laboratory is scheduled to blast off aboard a United Launch Alliance Atlas V rocket during a launch period that will stretch from Nov. 25 to Dec. 18. Web posted. (2011). [NASA readies Mars rover for launch [Online]. Available WWW: http://www.floridatoday.com [2011, August 13].]

**August 14:** **NASA completes testing of sophisticated Mars rover**

Engineers finished up functional testing of the $2.5 billion Mars Science Laboratory last week, verifying the Curiosity rover can make it to Mars and pursue scientific clues that the planet may have once harbored life. NASA will start configuring the car-sized rover for launch this week, then cocoon the sensitive robot inside a protective heat shield and ready the craft for liftoff Nov. 25 at 10:21 a.m. EDT from Cape Canaveral, Fla. The Curiosity rover's destination is Gale crater, a scenic impact site carved out of the Martian landscape when a comet or asteroid stuck the planet long ago. The crater spans 96 miles across, and Curiosity is aiming for a narrow target at the base of a lofty mountain towering nearly three miles high. Over the next few weeks, technicians working inside an ultra-clean processing facility will stow the rover's high-gain communications antenna, retract and lock the robot arm, latch its camera mast for launch, and tuck its six wheels into the configuration for the trip to Mars. The rover arrived at Kennedy Space Center on June 22 aboard a U.S. Air Force C-17 cargo plane. The mission's heat shield and aerodynamic shell was shipped to KSC in May. Once Curiosity is in launch shape, crews will place the rover beneath a rocket-powered descent stage. Similar to previous Mars landers, Curiosity will plow through the planet's thin atmosphere safeguarded by a heat shield attached to a nearly 15-foot-wide aeroshell, larger than the diameter of the Apollo command module. Engineers will encapsulate the rover and descent stage inside the cone-shaped aeroshell this fall. The final act will be adding the cruise stage, the spacecraft bus that will shepherd the rover from Earth to Mars during the nearly 10-month cruise through the solar system. Workers will add the rover's plutonium power source when the probe reaches the launch pad and is mated to the Atlas 5 rocket. Web posted. (2011). [NASA completes testing of sophisticated Mars rover [Online]. Available WWW: http://www.spaceflightnow.com [2011, August 14].]

**August 15:** **Falcon 9/Dragon: Preparing to Berth with the International Space Station**

In a SpaceX clean room shown above in Hawthorne (Los Angeles) California, technicians prepare the Dragon spacecraft for thermal vacuum chamber testing. NASA has given us a launch date of Nov 30, 2011 for Falcon 9 Flight 3, which will send a Dragon spacecraft to the International Space Station (ISS) as part of NASA's Commercial Orbital Transportation Services program. NASA has agreed in principle to allow SpaceX to combine all of the tests and demonstration activities that we originally proposed as two separate missions (COTS Demo 2 and COTS Demo 3) into a single mission. Furthermore, SpaceX plans to carry additional payloads aboard the Falcon 9's second stage which will deploy after Dragon separates and is well on its way to the ISS. NASA will grant formal approval for the combined COTS missions pending resolution of any potential risks associated with these secondary payloads. This week, we successfully completed a wet dress rehearsal (WDR) for the Falcon 9 Flight 3 launch vehicle at Space Launch Complex 40, Cape Canaveral, Florida. The WDR is a significant test during which we load propellant into the vehicle and perform all operations just as we would on launch day right down to T-1 seconds, at which point we abort and detank the propellant. Demolition work continues at Space Launch Complex 4 East, our new launch site at Vandenberg Air Force Base on the central coast of California. Recently, the crew dropped the big "hammerhead" overhanging structure from the legacy Titan IV Mobile Service Tower. Removing the tower is a major step in upgrading the pad for Falcon 9 and Falcon Heavy launches. We are targeting late 2012 to bring Falcon Heavy to Vandenberg for vehicle to pad integration tests and 2013 for liftoff. Web posted. (2011). [Falcon 9/Dragon: Preparing to Berth with the International Space Station [Online]. Available WWW: http://www.onoribt.com [2011, August 15].]

**August 16:** **NASA Names Terry Wilcutt Agency Safety Chief**

Terrence W. Wilcutt has been appointed NASA's chief of safety and mission assurance, effective Sept. 1. Wilcutt is a retired Marine colonel and veteran astronaut who is serving as director of safety and mission assurance at NASA's Johnson Space Center in Houston. He will assume the post from Bryan O'Connor, who will retire from the agency on Aug. 31. Web posted. (2011). [NASA Names Terry Wilcutt Agency Safety Chief [Online]. Available WWW: http://www.spaceref.com [2011, August 16].]

**After shuttle, space center looks to make 'something better for future'**

Unemployment and the economy dominate the news, but on Florida's Space Coast, hit hard by the shutdown of the shuttle program, efforts to make "something better for the future" are already under way, said the Kennedy Space Center's director. "Change is what you make it," said Robert Cabana. "It's hard because people become comfortable in what they know, but in order to have something better -- you have to change. I prefer to think we have a positive future." Cabana, a Catholic, was an astronaut for four shuttle missions. He also is a veteran, having served for 30 years in the U.S. Marine Corps. "We expected transition in the military and took it in stride," he said in an interview with Catholic News Service. "It's harder for the folks here that have been here 25-30 years. This is what they know and there aren't enough jobs to stay here. They have to go elsewhere. Yes, it's difficult to have something you know come to an end, but we have the chance to make something better for the future," said Cabana, a member of Divine Mercy Parish in Merritt Island. The space shuttle Atlantis' 12-day mission to the International Space Station in July was the last mission in the U.S. space shuttle program. Atlantis landed at the space center July 21. The 30-year-old shuttle program had 135 missions; two of the craft were tragically lost. Challenger broke apart 73 seconds after takeoff Jan. 28, 1986; its seven crew members died. Columbia disintegrated Feb. 1, 2003, during re-entry into the earth's atmosphere over Texas, killing its seven crew members. Cabana said plans call for transforming the Kennedy Space Center "from being a program-centric, government launch complex to a multiuser space port that supports both commercial and government launches," he told CNS. "We want to enable commercial space operations to lower earth orbit so that NASA can focus on the really difficult task of exploring beyond our planet." Web posted. (2011). [After shuttle, space center looks to make 'something better for future' [Online]. Available WWW: http://www.uscatholic.org [2011, August 16].]

**August 17: No foul play suspected in death at KSC**

The body of a 50-year-old homeless man was found earlier today in a vehicle at Dummitt Cove near Mosquito Lagoon, according to the Brevard County Sheriff's Office. Authorities said the man likely died of natural causes and do not suspect foul play. The man's name has not been released pending family notification. The body, in a Chevy Suburban covered with palm fronds, was found by Kennedy Space Center security officers about 10 a.m. today. Brevard County Fire-Rescue paramedics responded to the scene off Courtenay Parkway, north of the area where Kennedy Parkway intersects with the Max Brewer Memorial Parkway. Web posted. (2011). [No foul play suspected in death at KSC [Online]. Available WWW: http://www.floridatoday.com [2011, August 17].]

**Renaming Playalinda Beach will bring business, tourists to Titusville**

A groundswell is building to change the name of Playalinda Beach to Titusville Beach as a way to attract more buzz and more tourism for the city. Two groups -- the Greater Titusville Renaissance and the Titusville Citizen Budget Advisory Committee -- are pushing the plan to change the name of the beach that stretches for about 10 miles in Brevard County from the Titusville area north, along the shore. While the beach itself is not in Titusville, the most often used route to the beach is through Titusville and over the Indian River via the A. Max Brewer Bridge to Merritt Island. Renaming the beach -- long famous, or infamous, as a home for nude sunbathers in its most remote area -- after the city "is a very popular idea" with the groups. This isn't the first time a proposal has been raised to rename Playalinda as Titusville Beach. In 2004, then-Titusville Vice Mayor Ken Ward proposed that name change. But the idea didn't get traction at the time, and the Titusville City Council voted down the idea, in a 4-1 vote. Web posted. (2011). [Groups: Renaming Playalinda Beach will bring business, tourists to Titusville [Online]. Available WWW: http://www.floridatoday.com [2011, August 17].]

**SLS: Senators' Letters about SLS**

Earlier this month came word that a draft letter was circulating on Capitol Hill, reportedly linked to Utah's congressional delegation, calling on the administration to publish its design for the Space Launch

System (SLS) heavy-lift launch vehicle and ensure it makes use of solid rocket motors. The advocacy group Tea Party in Space (TPIS) recently obtained a signed copy of the letter, featuring the signatures of five senators, including Senate Majority Leader Harry Reid (D-NV) and four Republicans, most notably Orrin Hatch of Utah. TPIS minced no words in its reaction to the letter: "TPIS calls on these five senators to renounce this letter and apologize to Administrator Bolden and the hard working men and women at NASA." While five western senators signed one letter about the SLS, five southern senators have put their names to another letter critical of the administration's work on SLS. The letter to President Obama, dated Monday and signed by Republican senators from Alabama, Louisiana, and Mississippi, called on the White House to "immediately provide the Section 309 report to Congress", a reference to the provision of the 2010 NASA authorization act that called on NASA to provide Congress with a report the reference vehicle designs for the SLS and the Multi-Purpose Crew Vehicle (MPCV) within 90 days of the bill's enactment. The letter notes that the final report is now nearly 200 days overdue. "We believe the time has come to deliver the report to Congress." That letter is also critical of elements of NASA's 2011 operating plan, which includes spending money allocated for SLS on facility work at the Kennedy Space Center that the senators believe should not be charged exclusively to SLS. "The misallocation of SLS funds and the lack of synchronization between rocket and spacecraft development at NASA seem to suggest that this Administration has no intention of properly using appropriated funds," the letter concludes, asking for NASA to resubmit an operating plan "to ensure that the funds appropriated for SLS are used to develop the 130 metric ton heavy lift vehicle required in both the authorization and appropriations acts." Web posted. (2011). [SLS: Senators' Letters about SLS [Online]. Available WWW: http://www.spacepolitics.com [2011, August 17].]

**August 18: . SpaceX looks for an extra base**

Even as SpaceX prepares for its first visit to the International Space Station, it's looking for another spaceport to handle a whole different kind of launch traffic. SpaceX CEO Elon Musk has already said that SpaceX is thinking about establishing an additional base for launching Falcon rockets, to supplement its facilities at Cape Canaveral Air Force Station in Florida and the pad that's currently being renovated at Vandenberg Air Force Base in California. The Vandenberg pad is planned as the home base for SpaceX's Falcon Heavy rocket, which is designed to go after the Air Force's satellite launch business. "We have our main launch facility, which is Cape Canaveral in Florida. Then we are in the process of developing our second launch facility, which is Vandenberg in California. And we do intend to develop a third launch facility. Texas is one of the possible states. But we're also looking at a number of other locations: Puerto Rico, potentially another location in Florida, potentially Hawaii. And there are a few other locations that could work. So we're trying to make the right decision for the long term. "The third launch site would open early, in perhaps three or four years. So we want to make sure we make the right decision. But we do think we need three launch sites in order to handle all of the launch demand that we have been able to get. "It would be a purely commercial launch site, whereas Cape Canaveral and Vandenberg are actually Air Force bases — in the case of Cape Canaveral, it's sort of a joint NASA-Air Force activity. So it makes sense to have NASA and Defense Department launches occur from Cape Canaveral and Vandenberg, but then probably shift most of our commercial launches to a purely commercial launch site that's really aimed at being the best customer for a commercial launch provider. Just as there are Air Force bases and commercial airports ... there's some logic to separation." Web posted. (2011). [SpaceX looks for an extra base [Online]. Available WWW: http://www.msnbc.msn.com [2011, August 18].]

**NASA's twin lunar mappers moved to the launch pad**

After 55 years of launches, the historic Complex 17 at the Cape Canaveral received what could be its final satellite payload this morning when NASA's twin Moon-mapper probes arrived for mounting atop the Delta 2 rocket. The $496 million Gravity Recovery and Interior Laboratory mission is scheduled for blastoff September 8 to send the tandem satellites on their lunar voyage that seeks answers to scientists' lingering questions about the Moon. Once maneuvered into lunar orbits, the mirror-image craft will

bounce radio signals off each other to measure subtle changes in the distance between the two formation-flying satellites caused by the Moon's gravity. Such data about the gravity field can be used to infer the Moon's origins and composition of the lunar's deep interior structure. The venerable booster dispatching the spacecraft is United Launch Alliance's Delta 2, a workhorse rocket that will be making its 110th flight from Complex 17. But after sending GRAIL to the Moon, no further Florida launches are scheduled for the rocket to perform. Long-time users of the vehicle such the Global Positioning System and NASA science projects have moved to the larger Atlas 5 and Delta 4 systems, leaving the Delta 2 with an uncertain future. The California launch site for sending Delta 2 rockets into polar orbits from Vandenberg Air Force Base has one more mission firmly planned this October carrying a weather satellite. That pad's long-term viability depends on the potential for NASA or commercial customers to purchase five unsold Delta 2 vehicles for satellites being designed in the coming years that require West Coast launches. However, the prospects for Delta 2-class launch services needing an East Coast pad to reach equatorial orbits or Earth-escape trajectories appear virtually non-existent in the next few years. That means GRAIL could be Complex 17's grand finale unless the future outlook changes -- and soon. Complex 17 was built by the Air Force for the Thor intermediate range ballistic missile test program. Featuring two launch pads and a central blockhouse, construction of the site began in April 1956. Pad 17B hosted its first Thor launch in January 1957 and pad 17A supported its initial flight in August 1957. The complex, located on the southern end of Cape Canaveral Air Force Station, has undergone numerous upgrades and modifications over the decades as the Delta family was born and the rockets grew larger. NASA's Gravity Recovery and Interior Laboratory spacecraft have spent the past three months at the Astrotech processing facility near Kennedy Space Center getting ready to depart Earth on the lunar voyage. Launch remains targeted for September 8 at 8:37 a.m. EDT (1237 GMT). Since arriving in Florida from Lockheed Martin's factory in Colorado on May 20, the craft have been thoroughly tested, communications checked through the Deep Space Network, the power-generating solar arrays and internal batteries installed, and the maneuvering propellants loaded aboard. Web posted. (2011). [NASA's twin lunar mappers moved to the launch pad [Online]. Available WWW: http://www.spaceflightnow.com [2011, August 18].]

**Futron Study: U.S. Losing Ground In Space**

The U.S. remains top ranked among 10 nations in space competitiveness for 2011, but it is losing ground to global competitors as its space policy undergoes a major transition, especially in the area of human spaceflight, according to the Futron Corp.'s 2011 Space Competitiveness Index. The U.S. is perched atop a list that includes Europe, Russia, China, Japan, India, Canada, South Korea, Israel and Brazil, reports the Bethesda, Md., consultancy this week in its fourth annual ranking study. Futron examined 50 metrics in making the rankings, including a trio of overarching indicators: government, human capital and industry. "Of the 10 countries analyzed, only the United States has shown four straight years of competitiveness declines," Futron notes in an executive summary. "By contrast, Russia, China and Japan have improved their own space competitiveness by 12%, 27% and 45%, respectively, over their relative starting points from when Futron's benchmarking process began in 2008." Chinese gains are coming at the expense of the U.S. The Asian power matched the U.S. in numbers of launches during 2010 for the first time, the index notes. However, over the past decade (2001-10), Russia led all countries, with 248 orbital launches. The U.S. followed, with 197; next was China, with 70; and Europe, with 63. During the same period (2001-10), the U.S. produced the most spacecraft, 388; followed by Russia, with 219; Europe, with 188; and China, with 80. Overall trends studied by Futron reveal that cooperation in space tends to intensify competition. The report finds that global space activity drives a substantial economic engine as well as fostering national pride and advancements in science and exploration. "Moreover, whatever the purpose of space investment, it is enabled by a common denominator: human capital," according to the 2011 index. "Knowledge, skills and expertise ultimately define the leading edge of space activity. In a world where talent is mobile, the ability to educate, attract, retain and continuously enrich a base of skilled professionals is a growing determinant of which nations and actors lead in space

competitiveness." Web posted. (2011). [Futron Study: U.S. Losing Ground In Space [Online]. Available WWW: http://www.spaceflightnow.com [2011, August 18].]

**August 19: KSC Home to New Ground Processing Directorate**

KSC is home to a new organization called the Ground Processing Directorate (GPD), which officially was stood up on Aug. 14. GPD will support operations management, as well as strategies and techniques to launch future rockets and spacecraft from the center. The directorate will operate under NASA's new Human Exploration and Operations Directorate, supporting the International Space Station, Shuttle Transition and Retirement, Launch Services Program, the 21st Century Ground Systems Program and the Space Launch System heavy-lift rocket. GPD also will work with the Center Planning and Development Office for host support to potential and new center customers, and integration of launch complex operations. E-mail distribution. (2011). [KSC-Employee-Update Re: "KSC Home to New Ground Processing Directorate" [Electronic]. August 19, 2011.]

**Atlantis, engines go separate ways**

Removal of the last set of main engines to help propel a space shuttle into orbit is under way at Kennedy Space Center. Pratt & Whitney Rocketdyne crews on Thursday [August 18] pulled out the first of three 14-foot-long, 7,800-pound engines from Atlantis, which launched July 8 and landed July 21 to end the 135th and final shuttle mission. Work to remove a second engine was to begin at 8 a.m. today, followed by the last on Monday. "It's pretty bittersweet for us," said Candrea Thomas, a KSC spokeswoman. "It is a different feeling taking them out knowing that you're not refurbishing them for another shuttle mission." While NASA's three orbiters are bound for museums -- Atlantis will be displayed at Kennedy's Visitor Complex -- the engines' fate is uncertain. They could be reused by a heavy-lift rocket NASA is charged with building, but the agency has yet to release its plans -- prompting subpoenas last month from U.S. senators. In the meantime, KSC teams will run the engines through standard post-flight servicing and set them aside so they're ready for whatever future flights or tests are determined. Refurbished but unneeded nozzles, each measuring 8 feet in diameter, will be installed in Atlantis, Discovery and Endeavour for their public display. In Atlantis' processing hangar, the main engine removal follows the detachment of forward thrusters and will be followed by two orbital engine pods flanking the orbiter's tail fin. The nose and tail thrusters will be shipped to NASA's White Sands Test Facility in New Mexico for complete decommissioning, to make sure museum goers won't be exposed to any residual toxic chemicals. Shuttle main engines lighted 6.7 seconds before liftoff and fired for 81/2 minutes, burning more than 535,000 gallons of liquid hydrogen and liquid oxygen fed from the shuttle's orange external tank. Web posted. (2011). [Atlantis, engines go separate ways [Online]. Available WWW: http://www.floridatoday.com [2011, August 19].]

**August 21: A rocket's resurrection?**

The familiar green and white Delta 2 rocket now on the cusp of retirement could be given new life to launch a handful of NASA climate research satellites later this decade. NASA is considering proposals from United Launch Alliance and Orbital Sciences Corp. to add the Delta 2 and Taurus 2 rockets to the space agency's stable of launch vehicles for medium-class science satellites, according to industry and government sources. The companies submitted bids in an interim "on-ramp" period established by NASA to fill a void between lightweight rockets and the more costly intermediate-class Atlas 5 rocket. NASA is facing a cost crunch in the rocket business as rising launch prices threaten to scale back the agency's Earth science satellite program. United Launch Alliance's Delta 2 rocket is the only medium-class rocket available that meets NASA requirements to launch the agency's most complex and expensive payloads. It has carried 60 percent of NASA's scientific satellites into space over the last decade, and it can haul from 5,600 pounds to 12,000 pounds into low Earth orbit. But a 10-year omnibus contract signed last year between NASA and four launch companies didn't include the Delta 2. The Air Force stopped using the venerable launcher in 2009, and without a stable anchor customer, the Delta 2's future seemed uncertain. When the Air Force retreated from the Delta 2 program, NASA picked up the cost of maintaining the

rocket's ground infrastructure to ensure it was ready to launch a series of research missions through this year. There are now two NASA launches left on the Delta 2's manifest -- one from Florida and one from California. ULA didn't propose the Delta 2 rocket for the new NASA Launch Services contract awarded last year. Instead of picking the Delta 2, NASA ended up selecting ULA's larger Atlas 5 rocket, the Orbital Sciences Corp. Pegasus XL and Taurus XL launchers, SpaceX's Falcon 9 rocket and the Athena 1c and 2c vehicles from Lockheed Martin Corp. The contract's overall value could be as much as $15 billion for up to 70 missions over the next decade. When the space agency chooses rockets to launch unmanned satellites or robotic science probes into the solar system, managers usually must pick one of those approved vehicles to launch them from Earth. But as launch costs skyrocket -- rising by 50 percent in three years in some cases -- NASA is seeking more cost-effective solutions to launch a slate of Earth science satellites. Tightening federal budgets put more pressure on finding less expensive rockets to launch NASA payloads. ULA says it has components for five Delta 2 rockets left in its inventory. The rocket's production line has already been shut down. Vernon Thorp, ULA's program manager for NASA missions, said his company is proposing adding the Delta 2 to the space agency's pool of rocket choices for future satellite missions. Web posted. (2011). [A rocket's resurrection? [Online]. Available WWW: http://www.spaceflightnow.com [2011, August 21.]

**August 22: More oppose name change to Playalinda Beach**

A backlash has developed to a proposal to rename Playalinda to Titusville Beach -- a move that supporters say could spur more tourism and economic activity in Titusville. The plan, recommended by the seven-member Titusville Citizen Budget Advisory Committee, will be discussed tonight by the Titusville City Council. Titusville Mayor Jim Tulley said he opposes the name change, noting what appears to be widespread opposition from the community. Opponents of changing Playalinda's name who emailed the five city council members also received email responses from Vice Mayor Walt Johnson and council member Rita Pritchett, indicating they are leaning against supporting the proposed name change. Titusville Mayor Jim Tulley said he had received about 20 e-mails from residents on the issue -- all but two opposed to the name change. He said he personally would oppose pursuing a name change, based on the apparent opposition. "I'm not in favor of it," Tulley said. "I think Playalinda is a beautiful name." In fact, Playalinda is Spanish for "pretty beach." Myrna Palfrey, superintendent of the Canaveral National Seashore, which includes Playalinda, said property specialists at the U.S. Department of the Interior's National Park Service are continuing to research the process for seeking a name change, as well as the history of the Playalinda name. Web posted. (2011). [More oppose name change to Playalinda Beach [Online]. Available WWW: http://www.floridatoday.com [2011, August 22].]

**Controllers worried plane was threat to Kennedy Space Center**

Air-traffic controllers at Orlando International Airport considered an unresponsive private plane in the area to be a potential threat to Walt Disney World and Kennedy Space Center when they instructed a Southwest Airlines jet carrying 137 passengers to fly near and inspect the smaller plane, according to a new report by the federal agency investigating the March 27 incident. The report, released Friday by the National Transportation Safety Board, found that Southwest Airlines Flight 821 and the private plane, a Cirrus SR-22 en route from Picayune, Miss., to Kissimmee, ultimately came as close as 100 feet vertically and one-tenth of a mile laterally. The minimum required separation is 1,000 feet vertical or 3 nautical miles lateral. The Federal Aviation Administration, which suspended the controller involved, called the instructions "totally inappropriate." But controllers told NTSB that they "considered the Cirrus a potential threat to the Disney World complex and the NASA space center, where a space shuttle was on a launch pad," NTSB wrote in a fact-finding report detailing the incident. Controllers cited FAA rules charging them with providing support for national security and homeland defense. The pilot of the Cirrus told investigators that he lost contact with controllers between Eglin Air Force Base in the Panhandle and Kissimmee because the frequency he was using became "busier" with other communications. He said he attempted to radio controllers in Jacksonville multiple times without success. So the operations manager at OIA "considered the flyby a prudent action and had conducted similar actions in the past," NTSB wrote

in its report. Controllers radioed Southwest 821, a Boeing 737 jet flying to Orlando from Phoenix, and the captain of that flight agreed to the flyby. The Southwest jet approached the Cirrus from below on the left side at an altitude of about 11,000 feet, and the two planes made a slight left turn together. The Southwest pilot reported the silhouette of two people in the Cirrus cockpit but reported no movement. The commercial jet then separated and landed at OIA. The Southwest pilot made no mention of the maneuver to flight attendants or passengers. Just as the Southwest flight was departing for its landing, controllers in Jacksonville re-established communication with the Cirrus. The plane was ordered to contact Orlando controllers, who directed it to a safe landing in Kissimmee. Web posted. (2011). [Controllers worried unresponsive plane was threat to Disney World, Kennedy Space Center [Online]. Available WWW: http://www.orlandosentinel.com [2011, August 22].]

**August 23: Titusville council says no to beach name**

The Titusville City Council unanimously decided tonight against backing a proposal to change the name of Playalinda to Titusville Beach. The proposal came from a seven-member Titusville Citizen Budget Advisory Committee, which said the name change could spur more tourism and economic activity in Titusville. Playalinda is on Merritt Island, not in Titusville. But the most often used route to the beach is through Titusville and over the Indian River via the A. Max Brewer Bridge. Playalinda (which means "pretty beach" in Spanish) is part of the Canaveral National Seashore, which is overseen by U.S. Department of the Interior's National Park Service. Web posted. (2011). [Titusville council says no to beach name [Online]. Available WWW: http://www.floridatoday.com [2011, August 23].]

**August 24: KSC plans to remain open through Irene**

Kennedy Space Center expects to remain open as the powerful Hurricane Irene, now a Category 3 storm, passes by more than 230 miles to the east early Friday, according to the latest forecasts. From Thursday evening into Friday, the storm could dump two to four inches of rain on the center and blow sustained winds of 35 mph, gusting to 50 mph. But normal operations will proceed and no ride-out team is being activated. The center remains in its lowest alert level, called Hurricane Condition IV, and has no plans to elevate that status pending another status update Thursday morning. Overnight, slightly ahead of schedule because of the approaching storm, technicians at Cape Canaveral Air Force Station fitted a protective cone around two moon-bound spacecraft sitting atop a United Launch Alliance Delta II Heavy rocket. NASA's GRAIL mission remains on track for an 8:37 a.m. Sept. 8 blastoff from Launch Complex 17B. Web posted. (2011). [KSC plans to remain open through Irene [Online]. Available WWW: http://www.floridatoday.com *the flame trench blog* [2011, August 24].]

**Station partners assess impacts after cargo launch failure**

The upper stage of a Soyuz-U booster carrying an unmanned Russian Progress supply ship malfunctioned and shut down five minutes and 20 seconds after launch Wednesday from the Baikonur Cosmodrome in Kazakhstan, NASA officials said, sending 2.9 tons of space station supplies and equipment crashing back to Earth in the first post-shuttle launch to the lab complex, officials said. It was the second failure in a row for the Russian space program after the Breeze-M upper stage of a more powerful Proton rocket malfunctioned last Thursday, stranding a communications satellite in the wrong orbit. The Breeze-M is not related to the Soyuz-U's upper stage. The Progress M-12M/44P spacecraft was loaded with 2,050 pounds of propellant, 110 pounds of oxygen, 926 pounds of water and 2,777 pounds of U.S. and Russian dry cargo. While the supply train to the space station is critical for supporting a full-time crew of six, the lab complex currently is in good shape, flush with supplies and equipment delivered to the outpost aboard the shuttle Atlantis in July. But engineers want to find out what went wrong with the Soyuz-U upper stage as soon as possible because it is virtually identical to the third stage used by Russia's manned Soyuz spacecraft. Launch of the next manned Soyuz mission is targeted for Sept. 22. Web posted. (2011). [Station partners assess impacts after cargo launch failure [Online]. Available WWW: http://www.spaceflightnow.com [2011, August 24].]

**Workshop boosts concept of clusters to generate jobs in Brevard**

Brevard County's days launching space shuttles are over, but the Space Coast could become a player in emerging industries that fly tiny satellites or unmanned aerial vehicles. Those were among ideas discussed Tuesday during a local workshop to brainstorm business opportunities that participants hope could generate growth and jobs in the region. It was the latest in a series of meetings led by consultants hired to help the area regroup after the retirement of NASA's space shuttle program and roughly 8,000 associated layoffs of Kennedy Space Center contractors. The narrative centers on five industry sectors already identified as offering the best potential for job growth across Central Florida: clean energy, defense, life sciences, information technology and aerospace. Clusters, Ed Morrison, a consultant with Strategy-Nets and the Purdue Center for Regional Development, are collaborative networks of companies "trying to find new markets, new employees, trying to work together in new and different ways." By forming a cluster, companies previously unknown to each other could discover potential for partnerships or advocate for policies supporting innovation and jobs. Midwest communities hit by the auto industry downturn have used effectively used a cluster strategy to target opportunities in water management and solar energy, the consultants said. The nonprofit Space Coast Energy Consortium, including 15 to 20 energy companies, is one cluster formed through the initiative. For each of the five sectors, about 20 workshop participants at Brevard Workforce's offices on Barnes Boulevard sought to identify local assets and opportunities for collaboration. The energy group sees opportunity in making homes more efficient. Defense technology could cross over to keep healthcare records and networks secure. Aerospace opportunities included the manufacturing and launch of small satellites, the testing of unmanned vehicles and Space Florida's planned management of the International Space Station's National Lab, which could draw life science and biotech researchers. A follow-up meeting in October will prioritize three to five top growth opportunities before a November "summit" establishes teams and action plans. Web posted. (2011). [Workshop boosts concept of clusters to generate jobs in Brevard [Online]. Available WWW: http://www.floridatoday.com [2011, August 24].]

**August 25: Russian rocket failure likely to delay 1st post-shuttle astronaut launch**

A Russian rocket failure Wednesday likely will delay the first post-shuttle era launch of astronauts to the International Space Station and also could force a temporary reduction in the number of people living aboard the outpost. American astronaut Ron Garan and two Russian cosmonauts likely will extend six-month tours of duty at the space station rather than return to Earth as planned on Sept. 8. The planned Sept. 21 launch from Kazakhstan of a new station crew that includes U.S. astronaut Dan Burbank faces an indefinite delay while a Russian commission investigates the Soyuz rocket failure and the loss of an unmanned Progress supply ship. Station staffing would be cut from six to three if Russia cannot return Soyuz rockets to flight by late October. But NASA officials say the international crew of six people now living and working on the space lab are safe. They have provisions to last through at least March 2012, the result of a supply run flown aboard America's final space shuttle mission in July. And, officials are confident that investigators will quickly find the cause of the rocket failure. Web posted. (2011). [Russian rocket failure likely to delay 1st post-shuttle astronaut launch [Online]. Available WWW: http://www.floridatoday.com [2011, August 25].]

**Report: NASA made proper pick for retired shuttles**

NASA acted properly when it picked new homes for the retired space shuttles, the space agency's watchdog said Thursday. The shuttles were awarded in April to museums in suburban Washington, Los Angeles, Cape Canaveral, Fla., and New York, based on recommendations by a special NASA team and a decision by NASA Administrator Charles Bolden, a former shuttle commander. Congressional and local officials for two of the losing cities — Houston and Dayton — had asked for an investigation, alleging political influences in the bidding process. "We found no evidence that the team's recommendation or the administrator's decision were tainted by political influence of any other improper consideration," Inspector General Paul Martin wrote in the report released Thursday. "Moreover, we found no attempt by White House officials to direct or influence Bolden's decision making." The decision was based on

attendance, population, funding and the facility. NASA said 13 of the bidders met their requirements and rated those on several categories, giving them a numerical score. There was a scoring error for the Air Force Museum in Dayton and it should have tied with Cape Canaveral and New York, the inspector general found. But NASA chief Bolden told investigators that had he known about the tie, he still would have stuck with the cities he selected because they had bigger populations and more international visitors. Also Dayton museum officials told him they might not be able to raise enough money. Space Center Houston next door to Johnson Space Center ranked near the bottom of the list. It scored low for attendance, international visitors, museum accreditation and difficulty transporting a shuttle there. Museums in Chicago, Seattle, Riverside, Calif., San Diego and McMinnville, Ore., all scored higher than Houston. The Smithsonian Air and Space Museum had already been promised one shuttle for its hangar in Dulles, Va. It will get Discovery, and give up the Enterprise, a test vehicle that never flew in orbit. That will be shipped to the Intrepid Sea Air and Space Museum in New York City. Atlantis will stay in Cape Canaveral and go to the Kennedy Space Center Visitor Complex. Endeavour will go to the California Science Center in Los Angeles. The Florida and California museums, but not the Smithsonian, will have to pay at least $20 million to make the shuttles that flew in space safe for display — removing toxic materials and fuels — and transportation costs. NASA is picking up the tab for the Smithsonian. The shuttles are all still at Kennedy Space Center being decommissioned. Web posted. (2011). [Report: NASA made proper pick for retired shuttles [Online]. Available WWW: http://www.orlandosentinel.com [2011, August 25].]

**August 26: NASA Aims To Move Orion Test To Cape**

NASA intends to move a flight test of the abort system for the Orion crew exploration vehicle to Cape Canaveral from a missile range in New Mexico, and the agency is targeting March 2014 for the launch. The test flight is to be staged at Launch Complex 46 at Cape Canaveral Air Force Station, according to an agency white paper obtained by Florida Today. The test originally was scheduled to take place at White Sands Missile Range because the Orion spacecraft initially was designed to return to Earth and parachute down to land. But NASA since has changed that plan, and now, the spacecraft will splash down in water. Senior NASA officials this week decided there would be several advantages to launching the test flight from Cape Canaveral. A water landing could be executed, and the launch site would be located close to Orion assembly, integration and production facilities at Kennedy Space Center. A converted Peacekeeper missile will be used to launch an Orion crew module equipped with a Launch Abort System, which would use rocket motors to pull the spacecraft away from a booster rocket during a launch accident. The test is expected to last 8 minute and 23 seconds. The abort system rockets will be ignited 45 seconds into flight when the crew module is at an altitude of 40,000 feet. The Orion module will reach an altitude of 58,000 feet before parachutes deploy. Splashdown is expected to take place 10 miles off the coast of Cape Canaveral. Web posted. (2011). [NASA Aims To Move Orion Test To Cape [Online]. Available WWW: http://www.floridatoday.com [2011, August 26].]

**August 28: Press To MECO: Documentary released on Shuttle reporting**

For over 30 years, the Space Shuttle Program captured the hearts and minds of millions of people throughout the world. From following the missions on TV, in newspapers, on websites, the Shuttle program has been lived by people on every continent. And through it all, the missions, the people, and the workforce have been brought to life by reporters who have brought missions to the public. It goes without saying that the Space Shuttle is a labor of love – not only for the teams that worked their hardest to get these graceful vehicles ready for mission after mission, but also for the hundreds of diligent and dedicated media representatives who sacrificed in their personal lives to stay up late, get up early, adjust their sleeping schedules to bring the missions to life for the general public. Over the course of the Space Shuttle Program, numerous documentaries have been made about these magnificent vehicles, including their triumphs, their tragedies, and the people who have flown aboard them. But something was lacking: the media. In September 2006, a small team of individuals – who were nothing more than fans of the Space Shuttle Program – came together to produce a music tribute video for the return to service mission

of Shuttle orbiter Atlantis on the STS-115 flight of the Shuttle Program: the mission that resumed construction of the International Space Station in the wake of the 2003 loss of Shuttle Columbia. The music from the video – "Infinity" – would serve as the inspiration for the start of a permanent partnership between Larry Sullivan, Brian Papke, and Mike Astles – who played a major role in the formation of MaxQ before events in his personal life changed his contribution ability in the following years. Mike was, nonetheless, and instrumental figure in MaxQ's formative years. Over the years, Nathan Moeller, Steven Burgess, and I, Chris Gebhardt, joined the group as permanent members, serving to expand the knowledge base and technical expertise of the group. And from STS-115 through STS-128, the music video tributes for each and every Shuttle mission in that timeframe churned out. But for certain members of the group, one thing was missing, something that was only thought to be a far-out dream: witnessing the launch of a Space Shuttle from the Kennedy Space Center's press site. In association with NASASpaceflight.com, plans for an up-close and personal music video for the STS-129 flight of orbiter Atlantis began in the spring of 2009. As the project evolved, three of the MaxQ team members – Larry Sullivan, Brian Papke, and Steven Burgess – were fortunate enough to be granted media access to join me in covering the launch campaign for STS-129. From there, Larry became a permanent fixture at the Kennedy Space Center, covering numerous Shuttle-based events for every single mission from STS-129 through the closeout of the program in 2011. Within six months of the start of MaxQ filming operations at the Kennedy Space Center, the final member of the MaxQ team, Nathan Moeller, was able to dedicate a full week of time to filming for the documentary surrounding the launch of Shuttle Atlantis on the STS-132 mission in May 2012. The team would then assemble almost in its entirety again for the final launch of Space Shuttle orbiter Discovery and the STS-133 mission. From there, filming continued through STS-134's retirement flight of the Space Shuttle orbiter Endeavour and culminated along with the Program with the emotional flight of the Space Shuttle Atlantis and STS-135. The information presented in our documentary "Press To MECO" is a compilation of our experiences, our thoughts, our adventures, and our passions as we got the humbling opportunity to be up close and personal with three of our United States' greatest technological achievements: the Discovery, the Atlantis, and the Endeavour. We hope you all enjoy this very special look at what it's like to be a reporter at the Kennedy Space Center. For the MaxQ team, the experiences from 2009 through 2011 were truly some of the greatest and unexpected experiences of the team members' lives. And none of it would have been possible with the support of the NASASpaceflight.com community and the thousands Space Shuttle workers throughout the United States. Web posted. (2011). [Press To MECO: Documentary released on Shuttle reporting [Online]. Available WWW: http://www.nasaspaceflight.com [2011, August 28].]

**August 29: NASA assessing procedures to leave space station vacant**

Engineers are evaluating what steps are necessary to safeguard the International Space Station should the orbiting lab be temporarily evacuated in the wake of last week's Soyuz rocket failure. NASA officials are hopeful Russia will return the venerable Soyuz booster to service in time to avert such a circumstance, which would put the space station at increased risk in the event of serious equipment malfunctions. Engineers are analyzing what's needed to keep the station alive in case astronauts have to pull out of the international laboratory, according to Michael Suffredini, NASA's space station program manager. "There is a greater risk of losing ISS if it were unmanned than if it were manned," Suffredini said Monday. "The risk increase is not insignificant." Russia's Soyuz rocket -- the only vehicle able to carry astronauts to the space station after the space shuttle's retirement -- has been grounded since the Aug. 24 failure of a launch with a Progress resupply freighter heading for the outpost. Russia has tentative plans to return the Soyuz to flight in October with a pair of unmanned missions, eventually leading to the launch of the next space station crew by November. But Russia still must complete its investigation into last week's loss and implement corrective actions. Just in case the Soyuz rocket is still grounded in November, the space station's international partners assigned engineers to review procedures for abandoning the complex in orbit for up to several months. Web posted. (2011). [NASA assessing procedures to leave space station vacant [Online]. Available WWW: http://www.spaceflightnow.com [2011, August 29].]

**New Space Florida Board of Directors Announced**

Earlier this month, the new Space Florida Board of Directors held their first meeting of the 2011-2012 fiscal year at the Renaissance Tampa International Plaza hotel. During the board meeting, Space Florida's 2012 budget and numerous other projects were approved for the coming year. The meeting was held in conjunction with Enterprise Florida, due to the fact that the two organizations work closely together and now share many of the same board members. During the 2011 Florida legislative session, SB2156 (an economic development reorganization bill) was passed that included provisions which altered the membership of Space Florida's board. Statute now states that Space Florida "shall be governed by a 12 member independent board of directors which consists of the members appointed to the board of directors of Enterprise Florida, Inc." Six members of this board are appointed by Governor Rick Scott, three by Senate President Mike Haridopolos, and three by House Speaker Dean Cannon. Space Florida's board members are: - Lt. Gov. Jennifer Carroll, Co-Chair; - Jay Beyrouti, President, Monicarla, Ltd.; - Ron Campbell, Director, The Seminole Companies; - Vivian de las Cuevas-Diaz, Partner, Broad and Cassel; - Debra Duvall, Partner, Water Pointe Realty Group; - John Falconetti, President, Drummond Press;- Danny Gaekwad, CEO, NDS USA Information Technology & MGM; - Adam Hollingsworth, CEO, Parallel Infrastructure, LLC; - Chris Kise, Partner, Foley Larner; - Fred Leonhardt, Senior Partner, Gray Robinson PA; - Don Phillips, Managing Director, Phillips Development and Realty; - Hal Valeche, President, York Street Capital Advisors; - Phil Waller, Vice President, MWH Americas, Inc. In addition to its new Board, Space Florida will also have an Industry Advisory Council to aid in its governance. This 15 member advisory council is appointed by the Governor and will be made up of Florida residents with expertise in the space industry. Web posted. (2011). [New Space Florida Board of Directors Announced [Online]. Available WWW: http://www.spaceref.com [2011, August 29].]

**Senators back KSC space projects**

Florida's two U.S. senators have tried to brush back an attempt by colleagues to steer money from Kennedy Space Center to other sites involved in the development of NASA's planned heavy-lift rocket for exploration missions. In a letter to the White House dated Friday, Sens. Bill Nelson and Marco Rubio suggest an apparent "misunderstanding" about the need to fund not only the design and construction of a rocket, but facilities from which to process and launch it. "These projects have been selected because they decrease development and operations costs for the new vehicle," their letter states. Earlier this month, a group of five Republican senators from Alabama, Louisiana and Mississippi accused the Obama Administration of funding KSC upgrades "only tangentially related" to the rocket known as the Space Launch System. According to their Aug. 15 letter, NASA planned to "transfer" $340.2 million of the $1.8 billion allocated for the rocket project in 2011 to upgrade Kennedy infrastructure, rather than focusing on design and construction of the rocket and related engine tests. Such work would be performed at NASA facilities represented by the letter signers: Richard Shelby, Jeff Sessions, Thad Cochran, Roger Wicker and David Vitter. Their letter suggests the dismantling of a shuttle launch pad and modification of a crawler-transporter used to haul rockets to the pad, among other projects, should be funded by a separate NASA initiative to modernize Cape launch infrastructure, called the 21st Century Launch Complex project. Ground systems are essential to the eventual operation of the giant rocket and distinct from efforts to transition KSC into a multi-user spaceport that supports launches of other types of rockets, they argue. By modifying the launch pad and crawler-transporter, they say, "we're saving money and freeing up funds for rocket development and testing." Funding for ground support operations was always planned within this year's rocket program, as it was under the cancelled Constellation program, according a spokesman at NASA headquarters in Washington, D.C. And members of congressional appropriations committees had capped that funding at $250 million -- $90 million below NASA's initial request -- even before the southern senators' recent challenge. The KSC area more than makes up the difference through another $160 million approved for the 21st Century program, for a total of $410 million for launch infrastructure in 2011. Despite the skirmish over KSC projects, all the senators agree on one point: That NASA should immediately release its design and plans to build the heavy-lift rocket. Congress last year

approved legislation demanding the rocket be ready to fly by 2016, but NASA has questioned whether that is possible with available funding. Web posted. (2011). [Senators back KSC space projects [Online]. Available WWW: http://www.floridatoday.com [2011, August 29].]

**August 30: NASA's Technology Depleted, Report Says**

NASA's technology base is "largely depleted" and the agency hasn't been producing the breakthroughs needed to achieve new goals, the National Research Council said on Tuesday. "Currently available technology is insufficient to accomplish many intended space missions," including sending humans to the moon or Mars, as well as destinations closer to home, the council, part of the independent National Academies of Science, said in a report. With the end of the space shuttle program earlier this year, NASA and lawmakers have struggled to define clear-cut goals for the space agency, especially as government budgets shrink. On Monday, NASA officials raised the possibility that the International Space Station would need to be temporarily abandoned because of trouble with Russian spacecraft, which are now the main link to the station. The ambiguity has undermined innovation at NASA and hurt its ability to develop new technology, the panel found. "In the modern era, in which the goals of space exploration have expanded beyond a single target, the necessary technological developments have become less clear and more effort is required to evaluate the best path for a forward-looking technology development program," according to the interim report, commissioned on behalf of NASA's Office of the Chief Technologist as part of an ongoing review of technology development at the space agency. "NASA has now entered a transitional stage, moving from the past era in which desirable technological goals were evident to all, to one in which careful choices among many conflicting alternatives must be made," the research council said. While NASA officials are still reviewing the details, they largely agree with the report's observations, Bobby Braun, the space agency's chief technologist, said on Tuesday. A final report is expected to be completed by January, in time for FY 2012 budget planning. The findings will likely bolster NASA's efforts to protect itself from major budget cuts. Noting that "technological breakthroughs have long been the foundation of NASA's successes," the report said more stability in the agency's programs could help it develop new technology. Next year's final report is expected to include specific recommendations for NASA to improve its technology. Web posted. (2011). [NASA's Technology Depleted, Report Says [Online]. Available WWW: http://www.nationaljournal.com [2011, August 30].]

**Russia determines causes of back-to-back launch failures**

Investigators have identified the causes of consecutive launch mishaps with the Proton and Soyuz rockets, clearing a major hurdle in preparing to return the workhorse launch vehicles to flight. In an announcement Monday, the Russian space agency said the investigation into the Soyuz launch failure Aug. 24 was focusing on a malfunction in the rocket's third stage gas generator. The launch was carrying an automated Progress cargo ship to the International Space Station, and debris from the mission crashed in the Altai region of southern Russia. "Off-nominal performance of [Soyuz third stage] propulsion system was found by the board to be due to the gas generator whose operating conditions were disrupted," the Russian announcement said. The Soyuz investigation has not formally issued its findings or recommended corrective actions. A launch schedule for the next manned flight to the International Space Station will not be decided until the commission completes its work. The inquiry into the Aug. 17 launch mishap of a Proton rocket and Breeze M upper stage has concluded a programming error doomed that flight, the space agency said in a separate statement released Tuesday. Web posted. (2011). [Russia determines causes of back-to-back launch failures [Online]. Available WWW: http://www.spaceflightnow.com [2011, August 30].]

**August 31: ULA trimming local jobs**

The number of local jobs launching spacecraft in Florida continues to shrink and not just because of NASA's retiring shuttle program. United Launch Alliance, operator of Atlas and Delta rockets, will cut up to 70 Cape Canaveral positions and 180 companywide. A key factor is the final two scheduled launches of ULA's Delta II rockets, including one set to blast off Sept. 8 from Cape Canaveral Air Force

Station with a pair of NASA moon-mapping satellites. The company also cites efforts to consolidate operations and cut costs since its formation nearly five years ago, when The Boeing Co. and Lockheed Martin Corp. merged their rocket fleets and formed the joint venture. Since December 2006, the company has cut 308 positions overall and 73 at the Cape, leaving a total of 3,718 employees and 666 locally. The current layoffs are expected to affect 55 to 70 Cape employees, some of whom left this month through voluntary departures. The rest are expected to receive notice in early September and leave about two weeks after launch of NASA's GRAIL mission to the moon. ULA's local reductions come on the heels of roughly 2,000 layoffs of Kennedy Space Center contractors that followed completion of the final space shuttle mission July 21. Web posted. (2011). [ULA trimming local jobs [Online]. Available WWW: http://www.floridatoday.com [2011, August 31].]

**Space shuttle program officially ends**

NASA on Wednesday officially closed the books on the space shuttle program. Without ceremony, the program that launched 135 missions over 30 years -- the last in July -- ended and morphed into the new Space Shuttle Transition and Retirement Office, which begins operations today. The office is responsible for readying orbiters for public display and ensuring unneeded facilities and property are closed down, sold or made available to new users. Dorothy Rasco, a former shuttle program business manager who was already leading the transition process, heads the office from Johnson Space Center in Houston. John Shannon, the shuttle program manager since early 2008, thanked his remaining personnel for its service in an Aug. 16 letter. "I would like to personally thank the team for your tremendous dedication and skill," he wrote. "Your performance allowed the space shuttle to safely and successfully fly out the manifest, providing a strong finish to 30 years of operations." The letter instructed employees to begin billing their time to the transition office or their new organization. This week, Shannon was in Japan beginning a new assignment in which he will conduct a review of potential deep space human exploration missions and opportunities for international collaboration. Closeout of the shuttle program is an enormous effort expected to take two years. The program occupied 640 facilities and used more than 900,000 pieces of equipment with a value exceeding $12 billion, according to NASA. Much of the work will take place at Kennedy Space Center, where orbiters have been maintained and prepared for launch. NASA requested $89 million for shuttle transition and retirement work in the 2012 fiscal year that begins Oct. 1, but Congress has not yet approved a budget. Web posted. (2011). [Space shuttle program officially ends [Online]. Available WWW: http://www.floridatoday.com [2011, September 1].]

## SEPTEMBER

**September 1: Shuttle Update**

Shuttle Atlantis: Technicians in Orbiter Processing Facility-2 at NASA's Kennedy Space Center, Fla., are working liquid cooling garment loops 1 and 2 deservicing in Atlantis today. They'll also begin disconnecting the small pyrotechnic devices related to the orbiter boom sensor system. Shuttle Discovery: Technicians in Orbiter Processing Facility-1 are using protective suits as they continue component removals from Discovery's auxiliary power units today. NASA's space shuttle fleet began setting records with its first launch on April 12, 1981 and continued to set high marks of achievement and endurance through 30 years of missions. Starting with Columbia and continuing with Challenger, Discovery, Atlantis and Endeavour, the spacecraft has carried people into orbit repeatedly, launched, recovered and repaired satellites, conducted cutting-edge research and built the largest structure in space, the International Space Station. The final space shuttle mission, STS-135, ended July 21, 2011 when Atlantis rolled to a stop at its home port, NASA's Kennedy Space Center in Florida. As humanity's first reusable spacecraft, the space shuttle pushed the bounds of discovery ever farther, requiring not only advanced technologies but the tremendous effort of a vast workforce. Thousands of civil servants and contractors throughout NASA's field centers and across the nation have demonstrated an unwavering commitment to mission success and the greater goal of space exploration. Web posted. (2011). [Shuttle Update [Online]. Available WWW: http://www.spacemankind.com/ [2011, September 1].]

**Climate satellite moves to California launch base**

An advanced polar-orbiting weather observatory took a 1,600-mile roadtrip from Colorado to California this week, arriving at the satellite's Vandenberg Air Force Base launch site after the 40-hour journey. A crew of 16 people including team members from satellite-builder Ball Aerospace and NASA's project group escorted the spacecraft on the long-awaited shipment. Valued at $1.5 billion, the satellite's mission will continue global weather monitoring and climate data records while covering virtually the entire planet twice per day from its 512-mile-high polar orbit. Its launch atop a Delta 2 rocket is scheduled for October 25 during a 9-minute window opening at 2:48 a.m. local time (5:48 a.m. EDT). Web posted. (2011). [Climate satellite moves to California launch base [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, September 1].]

**NASA extends astronaut's stay on space station**

An American astronaut and two Russian cosmonauts will return to Earth on Sept. 15, leaving three others onboard the International Space Station while an investigation into an Aug. 24 Soyuz rocket failure continues on the ground. NASA flight engineer Ron Garan and two cosmonaut collagues -- Andrey Borisenko and Alexander Samokutyaev -- had been slated to return to Earth on Sept. 8, but their stay was extended after the loss of a Soyuz U rocket and a supply-filled Progress cargo carrier. An engine powering the third stage of the rocket shut down prematurely, and the Soyuz and Progress broke up in the atmosphere. The failure indefinitely delayed the planned Sept. 21 launch of a new station crew that includes U.S. astronaut Dan Burbank. The Soyuz FG rocket that launches crews to the station has an engine similar to the one that failed Aug. 24 after blasting off from Baikonur Cosmodrome in Kazakhstan. Web posted. (2011). [NASA extends astronaut's stay on space station [Online]. Available WWW: http://www.floridatoday.com/ [2011, September 1].]

**September 2: Blue Origin vehicle lost on test flight**

A test flight of a suborbital vehicle by secretive venture Blue Origin ended in failure last month, the company confirmed Friday. The Wall Street Journal first reported Friday that the vehicle was apparently destroyed on a test flight August 24 from the company's test site in a remote area of west Texas. Blue Origin founder Jeff Bezos, best known as the founder of Amazon.com, confirmed the test flight failure in a post on the company's web site later Friday. The vehicle, known as PM 2 on its experimental permit

with the FAA, suffered a "flight instability" at 45,000 feet (13,700 meters) at a speed of Mach 1.2, causing the vehicle's range safety system to shut down its engines. The failure appears to be unrelated to separate work on an orbital crew vehicle the company is doing under a funded Space Act Agreement with NASA as part of the space agency's Commercial Crew Development program. Web posted. (2011). [Blue Origin vehicle lost on test flight [Online]. Available WWW: http://www.spacetoday.net/ [2011, September 2].]

**Florida senators dispute Sen. Richard Shelby's criticism of spending at KSC**

Florida's U.S. senators say Alabama's U.S. senators misunderstand a federal law they all helped write, a law requiring NASA to build a heavy-lift rocket. Alabama Sen. Richard Shelby, R-Tuscaloosa, says the two delegations agree on the main point: NASA should start now on the new rocket formally known as the Space Launch System (SLS). Yet despite Shelby's focus on the bottom line, the dueling views aired in two August letters to the White House, marking a rare public split in the congressional front pushing the new rocket. The Alabama senators are furious that the White House has delayed development of Space Launch System even though Congress approved it last November in the NASA Authorization Act of 2010 and appropriated $1.8 billion for it for the fiscal year that ends this month. The SLS project office is in Huntsville at the Marshall Space Flight Center. Florida's senators share the frustration. So do Texas Republican Sen. Kay Bailey Hutchison and more than a few House representatives. They've all pressed NASA and the White House this year to get started on SLS. But the Shelby/Sessions letter went further and accused NASA of wrongly shifting some $341 million to Kennedy Space Center in Florida for improvements that they say should go to SLS. Those improvements at Kennedy are only "tangentially" related to the heavy-lift rocket project, according to the Alabama senators. Florida's senators sent their own letter to the White House 11 days later on Aug. 26 saying "there appears to be a misunderstanding." Democrat Sen. Bill Nelson and Republican Sen. Marco Rubio say they wrote to "clarify the intent of the law." Spending for improvements at Kennedy was always part of SLS, the Florida senators said. "A new launch vehicle includes much more than just a design and build phase," they said. For example, a new rocket needs a new launch pad and other new supporting infrastructure. Complicating the debate is the fact that, in the wake of the space shuttle program, two plans for Kennedy have similar names. One is the 21st Century Ground Systems project that is part of SLS, and the other involves general construction upgrades for what is called the 21st Century Launch Complex. It is designed to make Kennedy attractive long-term as a launch center. Which plans are supported by which line-items in the budget? That's what the dueling letters are all about. Web posted. (2011). [Florida senators dispute Sen. Richard Shelby's criticism of spending at Kennedy Space Center [Online]. Available WWW: http://www.blog.al.com/ [2011, September 2].]

**September 5: Brevard officials devise Canaveral National Seashore wish list**

The National Park Service wants the public to comment on a draft plan the service will use to guide the seashore's management over the next 15 to 20 years. Park officials will be on hand to answer questions about the plan at a public meeting 6 to 8 p.m. Sept. 19 at Titusville Public Library. The 404-page plan spells out four options that range from taking no action at all to increasing staff and spending multi-millions for a new headquarters -- a prospect not likely anytime soon, officials said, given such tough budget times. The plan's "no action" alternative would leave the park's yearly operating costs at $3.2 million and staff at 53 positions. But under the park service's "preferred" option, the operating budget would grow to $3.9 million and staffing to 63.5 positions, including two more law enforcement rangers. The plan does not specify when within the 20-year planning period the rangers would be added. While currently there are 53 positions, Lugo said only about 41 are filled. The preferred option also includes about $20 million for one-time facilities improvements, which could include design, construction, rehabilitation, or reuse of visitor centers, roads, parking areas, administrative facilities, fire stations and other facilities. The preferred option also would include $5.3 million to improve visitor access to seashore resources. All four options include attending to a $9.5 million maintenance backlog. The preferred option emphasizes "retaining the national seashore's relatively undeveloped character and providing uncrowded

experiences by dispersing visitors via a shuttle service or canoe, kayak, hiking and walking trails, and bicycle trails." Congress created Canaveral National Seashore in 1975. The park includes 58,000 acres of barrier island, open lagoon, coastal hammock, pine flat woods and 24 miles of undeveloped beach. The seashore also boasts Turtle Mound, a 35-foot-high mound of oyster shells constructed by Native Americans between 800 A.D. and 1400 A.D. About 1.5 million to 1.2 million visit the Canaveral National Seashore each year. Web posted. (2011). [Brevard officials devise Canaveral National Seashore wish list [Online]. Available WWW: http://www.floridatoday.com/ [2011, September 5].]

**National Space Club's Rising Star award is part of space ceremonies**

For the first time, annual awards presented by the National Space Club Florida Committee will honor a rising star in the aerospace industry, along with three lifetime achievers. Megan Jaunich, a system safety engineer with Millennium Engineering and Integration Co., is the first recipient of the Rising Star award. "Megan's dedication to her profession and her strong community outreach is an inspiration for our current and future space professionals," club board chairman Stephen Feldman said in a press release. A Florida Tech graduate from Satellite Beach, Jaunich has received several NASA certificates and awards for recommendations that improved assessment of payloads, spacecraft and instrument subsystems. Jaunich will be honored Sept. 13 at the space club's monthly luncheon meeting in Cape Canaveral, along with three recipients of annual Lifetime Achievement Awards: * Larry Ellis of Jupiter is a 47-year veteran and former director of space shuttle processing and integration, director of expendable vehicles and deputy director of International Space Station work at Kennedy Space Center. * Norman Neiman of Winter Park over 50 years has worked on Delta and Atlas rockets. During the Apollo program, he served as Grumman Aerospace Corp.'s chief support engineer for lunar module ground systems at KSC. * Chester Wasileski of Titusville is a former director of project engineering responsible for all KSC facilities. Projects included modifications to Launch Complex 39 in preparation for the shuttle program. Web posted. (2011). [National Space Club's Rising Star award is part of space ceremonies [Online]. Available WWW: http://www.floridatoday.com/ [2011, September 5].]

**September 6: Federal budget cuts in Florida likely to hurt**

With hopes dimming that a congressional "super committee" can devise a plan to fix the federal deficit, Florida officials already are bracing for $1.2 trillion in budget cuts that automatically would go into effect if policymakers can't reach an agreement by year's end. What gets cut, and who is affected, is largely undecided. But there is growing concern that the cuts could lead to lost jobs in the defense industry, further contractions at NASA's Kennedy space Center and delays or worse for projects such as beach restoration and Everglades preservation. "The only thing certain about this is the uncertainty," said Marcia Howard, executive director of Federal Funds Information for States, which tracks federal spending to states. Early clues suggest retirees in Weston would fare better than military contractors in Orlando, and low-income and senior "safety-net" programs will be protected. That's a major reason why Florida would be hurt less than most states. Most worrisome to Florida business leaders are any defense cuts. With about two dozen major bases and command centers, Florida receives about $30 billion in defense dollars annually with an total economic footprint nearing $60 billion. "Defense has a huge impact on the economic health of Florida," said Joe Marino, president of Florida League of Defense Contractors. Web posted. (2011). [Federal budget cuts in Florida likely to hurt [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, September 6].]

**Weather Iffy for Delta Rocket Launch Thursday**

NASA aims to launch a mission to the moon this week but stormy weather could conspire to keep a United Launch Alliance Delta II rocket on the ground. The 125-foot Delta II Heavy is scheduled to blast off from Cape Canaveral Air Force Station's Launch Complex 17B at 8:37 a.m. Thursday. A second, 60-second window will open at 9:16 a.m. if need be. Nestled atop the rocket: NASA's twin GRAIL spacecraft. The mirror-image satellites will map the gravitational field of the moon during an 82-day science campaign next spring. They are due to arrive at the moon on Dec 31 and Jan. 1 after a low-energy

approach to Earth's sole natural satellite. The weather forecast for launch is a bit iffy. It calls for a 60-percent chance that thunderstorms or electrically charged clouds would keep the rocket grounded either Thursday or Friday. Web posted. (2011). [Weather Iffy for Delta Rocket Launch Thursday [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, September 6].]

**Minotaur launch campaign begins at Alaska spaceport**

Preparations to launch a U.S. Navy communications satellite have kicked off in Alaska three weeks before a souped-up Minotaur rocket will pilot the spacecraft to an orbit 7,500 miles above Earth. Technicians began transferring the three lower stages of the Minotaur 4 rocket to Launch Pad No. 1 at Kodiak Launch Complex on Monday, kicking off assembly of the solid-fueled launcher ahead of its Sept. 27 blastoff. The Minotaur's first stage, a decommissioned SR118 Peacekeeper missile motor, was placed atop the launch pad's pedestal Monday. The second and third stages of the Minotaur 4 will be stacked Tuesday, according to Alaska Aerospace Corp., which operates the oceanfront launch complex. The launch site is positioned on the southern shore of Kodiak Island in southern Alaska. Workers inside a clean room at Kodiak are finishing up work on TacSat 4, a Navy-led satellite designed to offer additional UHF communications channels to U.S. forces in Afghanistan and the Middle East. Once the satellite is fueled and configured for launch next week, engineers will enclose the 1,000-pound craft inside the Minotaur 4 rocket's 92-inch payload fairing. The Minotaur's fourth stage and nose cone should be moved to the launch pad attached to the rocket around Sept. 14, according to the Air Force, which is providing the launch services for the Defense Department's Operationally Responsive Space office. After final readiness reviews and a mission dress rehearsal, officials will give a final go-ahead for liftoff Sept. 27 at approximately 1545 GMT (11:45 a.m. EDT), or just before sunrise at the Alaska launch site. Web posted. (2011). [Minotaur launch campaign begins at Alaska spaceport [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, September 6].]

**September 7: Pratt might jettison Rocketdyne**

With support to explore outer space waning in Congress, Pratt & Whitney's president said the company is considering a sale of its Rocketdyne division. Pratt, a division of Hartford-based United Technologies Corp., acquired Rocketdyne in 2005 for $700 million. Richard Pettibone, an aerospace analyst for Newtown-based Forecast International, said U.S. space exploration is facing an uncertain future. He said this is the first time since the country ventured beyond the atmosphere that it doesn't have a clearly defined mission. While the space program is bogged down by budgetary concerns and political arguments over its direction, exploration will not completely end and that means Rocketdyne "could be on the forefront of space technology in four or five years," Pettibone said. But the company is looking at some difficulties. Rocketdyne supplied the main engine for the Space Shuttle missions, which have been discontinued. However, it does provide the booster for other rockets used for satellite launches. A Delta II rocket, using a Rocketdyne booster engine, is scheduled to launch Thursday, carrying the $496 million Gravity Recovery and Interior Laboratory project from Cape Canaveral in Florida. Web posted. (2011). [Pratt might jettison Rocketdyne [Online]. Available WWW: http://www.ctpost.com/ [2011, September 7].]

**Meet a moon-walker, Uhura of 'Star Trek' at KSC**

Crowds at the Kennedy Space Center Visitor Complex viewing Thursday's scheduled launch of the GRAIL mission to the moon also will be able to meet an Apollo moon-walker and a Starship Enterprise officer. The visitor complex has scheduled four days of activities, beginning today, surrounding the mission, including Thursday's appearances by Apollo 16 astronaut Charlie Duke Jr. and Nichelle Nichols, who played Lt. Uhura on the original "Star Trek" TV series. With the shuttle program ended, officials of the visitor complex and other Space Coast tourism businesses hope to spark growing spectator interest in unmanned launches like this one. A United Launch Alliance Delta II Heavy rocket will carry the twin Gravity Recovery and Interior Laboratory -- or GRAIL -- spacecraft to the moon. The spacecraft will orbit the moon for several months, collecting data of the gravity field, helping scientists determine the

structure of the lunar interior and to advance understanding of the evolution of the moon. During his visit Thursday [September 8th] to the visitor complex, Duke will discuss his experiences on the moon's surface, conduct a book signing and host a special "Lunch with an Astronaut" program. Nichols will mark the 45th anniversary of the first airing of the original "Star Trek" television series by signing autographs and taking photos with people at the visitor complex. In 1977 and 1978, Nichols worked to help recruit the first women and minority astronauts for the space shuttle program. Web posted. (2011). [Meet a moon-walker, Uhura of 'Star Trek' at KSC [Online]. Available WWW: http://www.floridatoday.com/ [2011, September 7].]

**NASA stays positive on Soyuz fixes**

NASA is confident its Russian partners will find and fix the cause of an Aug. 24 Soyuz U rocket failure in time to avoid evacuating the International Space Station, U.S. space agency chief Charlie Bolden said Wednesday. "We're getting to the point where we're going to satisfy ourselves that we can launch an unmanned vehicle to demonstrate that Soyuz is still OK, and then we'll fly the crew up on a normal Soyuz mission later this fall," Bolden said during a visit at Kennedy Space Center. An evacuation of the International Space Station became a possibility after a robotic Russian supply ship bound for the outpost was lost in a launch failure. An engine powering the third stage of the rocket shut down in flight, and the Soyuz U and its cargo broke apart during a resulting atmospheric reentry over a remote area in the Altai Republic. The Soyuz FG rockets used to launch people to the station have a similar third-stage engine. So Russian engineers want to make sure they resolve the problem before launching the next outpost crew. That crew "is still in training and ready to go when we say they're going to go," said Bolden, a former shuttle pilot and mission commander. Web posted. (2011). [NASA stays positive on Soyuz fixes [Online]. Available WWW: http://www.floridatoday.com/ [2011, September 8].]

**September 8: NASA Lunar Launch Delayed Until Saturday**

The planned launch Friday of NASA's twin moon mappers aboard a United Launch Alliance Delta II Heavy has been postponed until Saturday so engineers can review propulsion system data gathered during the draining of propellants from the rocket after an scrubbed initial attempt Thursday. The 12-story rocket and NASA's lunar gravity field mappers now are scheduled to blast off at 8:29 a.m. Saturday. A second opportunity would come at 9:08 a.m. that day if need be. The forecast for Saturday calls for a 60 percent chance conditions will be acceptable for launch. The exact nature of the propulsion system problem was not clear when NASA and United Launch Alliance announced the postponement late today. However, the rocket's onboard tanks were drained of all propellant after a launch attempt was scrubbed Thursday due to higher-than-allowable upper-altitude winds. Web posted. (2011). [NASA Lunar Launch Delayed Until Saturday [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, September 8].]

**ATK tests five-segment motor**

Alliant Techsystems (ATK) successfully carried out Thursday the third test of a five-segment solid rocket motor that could be used for NASA's Space Launch System and a commercial rocket. The test of Demonstration Motor 3 (DM-3), held Thursday afternoon at ATK's Utah facilities, was primarily intended to test the motor's performance at hot temperatures. ATK officials declared the test a success shortly after the two-minute motor firing. The five-segment motor, based on the four-segment motors used for the Space Shuttle program, was originally intended for the Ares launch vehicles are to be developed for the Constellation program. Now, the motor may be used for the Space Launch System heavy-lift rocket that replaced Ares, although no formal design decision has been released by NASA. ATK has also announced plans for a commercial rocket, Liberty, that would use the motor as its first stage. Web posted. (2011). [ATK tests five-segment motor [Online]. Available WWW: http://www.spacetoday.net/ [2011, September 8].]

**September 9: SpaceX Acknowledges Falcon 9 Engine Anomaly**

Space Exploration Technologies (SpaceX) Corp. acknowledged that its Falcon 9 rocket experienced an engine anomaly during its December launch of the company's reusable Dragon space capsule. "I'd call it an oxidizer-rich shutdown," former NASA astronaut Ken Bowersox, SpaceX's vice president of astronaut safety and mission assurance, told *Space News* in a Sept. 9 interview. "So because of that, when you get that mixture change happening, the temperatures can go up higher than you want inside the gas generator." That presents an obstacle for SpaceX, which eventually intends to reuse the nine Merlin engines that power the Falcon 9. Despite the engine anomaly, Falcon 9 successfully delivered Dragon to orbit during the Dec. 8 mission, an orbital demonstration flight conducted under NASA's Commercial Orbital Transportation Service (COTS) program. Web posted. (2011). [SpaceX Acknowledges Falcon 9 Engine Anomaly [Online]. Available WWW: http://www.spacenews.com/ [2011, September 9].]

**September 10: NASA selects newly formed nonprofit to manage space station lab research**

The promise of a diverse science portfolio including experiments that could produce valuable products on Earth helped a Florida nonprofit win responsibility for non-NASA research on the International Space Station. NASA on Friday formally announced a 10-year agreement with the Kennedy Space Center-based Center for the Advancement of Science in Space, or CASIS, which will manage the portion of the station designated a U.S. National Lab. Agency officials said the center's proposal, led by Space Florida, stood out from three others because of its process for evaluating not only basic science but experiments that might have useful commercial applications. With assembly of the 15-nation, $100-billion station completed during the final shuttle missions earlier this year, NASA and its partners are focusing attention on science research and "utilization" of the complex. Congress designated the outpost a National Lab in 2005 and NASA was required to turn over its management to an independent entity. The lab offers access to U.S., European and Japanese facilities inside and outside the station. Time allotted for U.S. research is split 50-50 with NASA, which will continue its own experiments. The station is expected to operate until at least 2020, though a recent problem with a Russian rocket has already raised concerns about keeping it staffed through this year. The center became a functioning entity last week and is in the process of hiring up to 30 or 40 staff members who will be based at the Space Life Sciences Lab at KSC and operate with $15 million from NASA. Space Florida, the state's aerospace economic development agency, considers the center's selection a key win in its effort to diversify the area's space industry after the shuttle program and to rebrand Kennedy as more than a place to launch rockets. Web posted. (2011). [NASA selects newly formed nonprofit to manage space station lab research [Online]. Available WWW: http://www.floridatoday.com/ [2011, September 10].]

**Delta II launches on GRAIL moon mission**

A United Launch Alliance Delta II rocket blasted off from Cape Canaveral Air Force Station today, setting sail with two NASA moon mappers on the first leg of lunar excursion. The 12-story rocket launched at 9:08 a.m., the second of two, one-second opportunities to put the spacecraft on course for a three-month journey to the moon. The launch is the first leg of a $496 million mission to map the gravitational field of the moon. Doing so will enable scientists to determine the make-up of the moon from crust to core. Web posted. (2011). [Delta II launches on GRAIL moon mission [Online]. Available WWW: http://www.floridatoday.com/ [2011, September 10].]

**September 11: NASA set to fund space taxi systems**

NASA next year will fund the development of at least two space taxi systems that could return astronauts to orbit aboard U.S. vehicles by late 2016. The agency this week released draft terms of a contract that aims to complete designs of those systems by 2014, after which one or more would be chosen for a follow-up phase that builds and tests vehicles. The draft request for proposals proves the agency's commitment "to outsource our space station transportation so NASA can focus its energy and resources on deep space exploration," NASA Administrator Charles Bolden said in a statement. Potential providers

of the outsourced crew flights, which would launch from the Space Coast, have a month to review and comment on the draft before a final version is released late this year. SpaceX is one of the four companies that shared nearly $270 million in NASA funding this year to advance designs of spacecraft able to fly people to and from the International Space Station. Blue Origin, The Boeing Co. and Sierra Nevada Corp. Space Systems were the others. The next contract phase intends to develop integrated transportation systems, combining spacecraft with launch vehicles, escape systems and all the ground systems necessary to launch at least four astronauts to the station. Expected to be awarded next summer, the next contract phase could be worth $1.6 billion between 2012 and 2014, NASA says. NASA last week announced it would abandon the use of more simple Space Act Agreements in favor of federal contracts that some companies consider more costly and bureaucratic. Representatives of NASA's Commercial Crew Program, based at Kennedy Space Center, called the contracts a non-traditional compromise that meets legal obligations while limiting burdensome requirements. The contract would award companies fixed payments when technical milestones are met and a series of three system and safety reviews completed. Web posted. (2011). [NASA set to fund space taxi systems [Online]. Available WWW: http://www.floridatoday.com/ [2011, September 11].]

**September 12: Rocket assembly underway for Mars launch**

United Launch Alliance has begun assembling the Atlas 5 rocket that will dispatch NASA's Curiosity rover to Mars in November, commencing a campaign to prepare the copper and white launcher for liftoff. Workers trucked the 106-foot-long first stage of the Atlas 5 rocket Thursday [September 8th] from the Atlas Spaceflight Operations Center to Complex 41, the seaside launch pad from which Atlas vehicles blast off with payloads for the U.S. military and NASA. The first stage was lifted upright inside the pad's Vertical Integration Facility and placed atop a mobile launch platform. United Launch Alliance was supposed to start adding four solid rocket boosters around the circumference of the Atlas first stage this week. The rocket's Centaur upper stage will be stacked Sept. 20. The rocket's wet dress rehearsal, which includes a practice countdown and fueling of the launch vehicle, is scheduled for Oct. 12. Cocooned inside the Atlas rocket's five-meter diameter nose cone, the Mars Science Laboratory will be transported from its clean room at the Kennedy Space Center to the launch pad in November. Liftoff of the $2.5 billion mission to Mars is set for Nov. 25. The Curiosity rover will touch down on Mars in August 2012 to begin searching for clues the Red Planet was once habitable for life. Web posted. (2011). [Rocket assembly underway for Mars launch [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, September 12].]

**September 13: Shuttles live on at Kennedy Space Center – Legoland version**

The soon-to-open Legoland Florida has chosen Kennedy Space Center to be among its Miniland USA models, and the space shuttle program is alive and well in small block form. The park opens on Oct. 15. Web posted. (2011). [Shuttles live on at Kennedy Space Center – Legoland version [Online]. Available WWW: http://www.orlandosentinel.com/ *the write stuff blog* [2011, September 13].]

**Russia Announces Next Manned Space Flights**

Russia has announced the dates of its next manned space flights, after delaying previously scheduled missions following the crash of an unmanned Soyuz rocket carrying cargo to the International Space Station. In a statement Tuesday, Russia's space agency Roskosmos said the next manned space flights are now set for November 12 and December 20. The Soyuz crash last month prompted Russia to cancel all manned flights pending an investigation into the accident. Roskosmos also announced plans to send an unmanned cargo ship to the space station on October 30. Earlier, the Russian space agency said it would like to send two unmanned missions up before flying any manned missions. With the retirement of the U.S. Space Shuttle fleet, Russia is the only country capable of sending manned missions into space. But Roskosmos says it is closely consulting with its colleagues at the U.S. space agency, NASA, regarding upcoming missions. The first three of the six astronauts on board the International Space Station are scheduled to return to Earth on Friday. NASA raised the prospect of bringing the remaining crew home if

the space station cannot be resupplied by the end of November. Web posted. (2011). [Russia Announces Next Manned Space Flights [Online]. Available WWW: http://www.spaceref.com/ [2011, September 13].]

**NASA experts to assist ATK on commercial crew rocket**

NASA and Alliant Techsystems Inc., a leading rocket contractor, announced Tuesday they will share data and expertise in helping design and develop the Liberty rocket, a U.S.-European launcher that could haul humans into Earth orbit by 2015. In a press conference at the Kennedy Space Center, government and industry officials said the unfunded Space Act Agreement, or SAA, will allow both entities to communicate and collectively analyze the design of the Liberty rocket. Alliant Techsystems, or ATK, will continue funding development of the Liberty rocket with internal capital under the Space Act Agreement, which includes four milestones and runs through March 2012. The company plans to bid for NASA funding next year. "An SAA is an approach in which we both share data and we both share ideas to move forward with a particular design or a particular concept," said Ed Mango, manager of NASA's commercial crew program. "We believe that this effort that we start today will go through next spring and will allow ATK and the commercial crew team, our team of managers, engineers and safety folks, to explore the Liberty design that ATK is wanting to talk about." ATK's Liberty concept was passed up in April when NASA directed funds to four companies designing and testing commercial spacecraft that could transport astronaut crews to the International Space Station. The agreement between NASA and ATK covers technical exchanges during the preliminary design review phase of the Liberty program, according to ATK. Mango said NASA would aid ATK with structural, thermal and vibration analyses, plus other core engineering disciplines. If Liberty is ultimately approved for operations, it could be ready for test flights in 2014 and launching astronauts into orbit by 2015. ATK says the Liberty will cost about $180 million per flight. Web posted. (2011). [NASA experts to assist ATK on commercial crew rocket [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, September 13].]

**September 14: NASA unveils next spaceship — a hybrid shuttle**

After months of debate, NASA has settled on plans for its next spaceship — a space shuttle hybrid that will fly twice in the next decade and cost $30 billion through 2021, according to senior administration officials and internal NASA documents. That NASA decided to recycle elements of the shuttle is not unexpected. Last year, Congress and the White House agreed NASA should reuse equipment from old programs and the new design — which includes a giant fuel tank and two booster rockets — largely reflects that compromise. The most noticeable change is the plane-like orbiter will be replaced by an Apollo-like crew capsule atop the tank. What is surprising — and potentially controversial — is the cost and scope of the new mission, especially since NASA largely is relying on 30-year-old technology to build the new rocket. As scheduled, NASA will fly an unmanned test flight in 2017 and a crewed mission in 2021. If NASA stays on budget, which is far from certain given NASA's history of cost overruns, each mission would cost about $15 billion apiece, although planned missions after 2021 would reduce that average price tag. Related NASA documents show there would be a flight every year or two after 2021. Unknown, however, is the destination. A senior administration official, who was not authorized to speak on the record, said NASA had not picked where it planned to send either the unmanned capsule in 2017 or the crewed capsule in 2021. Web posted. (2011). [NASA unveils next spaceship — a hybrid shuttle [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, September 14].]

**By the numbers: NASA's Space Launch System**

Billed as the biggest rocket ever built, NASA's concept for a behemoth heavy-lift booster unveiled Wednesday will initially weigh 5.5 million pounds, stand taller than the Statue of Liberty and generate 10 percent more thrust than the Saturn 5 moon rocket produced at liftoff. Powered from the launch pad on its first flight by two solid rocket boosters and three hydrogen-fueled main engines, the Space Launch System would initially haul 70 metric tons, or about 154,000 pounds, of payload into low Earth orbit. That's more than double the lift capacity of any operational launch vehicle today. NASA says it will cost

$10 billion to design and develop the mega-booster in time for its first test launch by the end of 2017. It will cost another $6 billion to get the Orion capsule, or Multi-Purpose Crew Vehicle, ready for flight. Modifications and upgrades to launch infrastructure at the Kennedy Space Center in Florida will cost $2 billion more. The twin five-segment solid rocket motors and three RS-25D/E engines are derived from equipment used on the space shuttle program. It's likely the early missions of the enormous rocket would fly with hardware that helped launch space shuttles. NASA plans to plug its existing inventory of space shuttle main engines for the first few heavy-lift rocket flights. The engines are designed to be reusable, but they would crash back to Earth and be destroyed with the launcher's 27.5-foot-diameter core stage on SLS missions. In its earliest crew configuration, the super rocket will stand 320 feet tall and weigh as much as 24 fully-loaded Boeing 747 jumbo jets. Its three main engines and pair of boosters will ramp up to 8.4 million pounds of chest-thumping thrust at liftoff, more than the Saturn 5 moon rocket or the space shuttle. That thrust level is equivalent to the horsepower of 160,000 Chevrolet Corvette engines, according to NASA. With the addition of two more RD-25D/E engines on the first stage, the Space Launch System's "evolved" architecture would be able to deliver 130 metric tons, or 286,000 pounds, of mass to low Earth orbit. Its voluminous nose fairing would carry 9 school buses into space. Its mass would increase to 6.5 million pounds and it would stand as tall as a 40-story building. The extra propulsion would raise its liftoff thrust to 9.2 million pounds, 20 percent more than the Saturn 5 rocket's powerful F-1 first stage engines. Web posted. (2011). [By the numbers: NASA's Space Launch System [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, September 14].]

**September 15: Test flight could bring 2,000 KSC jobs**

Preparations for a 2017 test flight of NASA's giant new rocket for deep space exploration could add up to 2,000 jobs at Kennedy Space Center, the center director said Thursday. "Those folks will need to be here processing the rocket for the launch," KSC chief Bob Cabana told reporters. Cabana expects the jobs to start coming online in 2014 or 2015, reversing the sharp drop in contractors that accompanied the shuttle fleet's retirement this year. Total KSC employment is expected to drop to about 8,200 within a year or two, down from 15,000 in early 2009. It's now about 9,000. Cabana expects the total to rebound to about 10,000 "in the 2016 timeframe" as engineers and technicians prepare the 320-foot Space Launch System for an unmanned test launch. NASA on Wednesday announced plans to build the rocket and the Orion crew capsule at a cost of $3 billion annually. The job projections are very preliminary, and actual numbers will depend on contracts yet to be awarded. But Cabana estimated between 1,300 and 1,600 people would be needed to work on the heavy-lift rocket and related ground systems. Another 300 to 400 would perform final assembly and checkout of Orion, which NASA hopes to fly with a crew for the first time in 2021. Test flights of Orion and its abort system could occur as early as 2014. But with the first crewed flight at least a decade away, some local officials aren't convinced the program will create any quick influx of local jobs. "In the early years it's going to use up existing hardware, so if there are jobs associated with those early years for Florida, it's not clear that they are significant," Space Florida President Frank DiBello said Wednesday. Cabana also pointed to NASA programs readying commercial rockets and spacecraft for launches of cargo and astronauts to the International Space Station as the nearer-term reason for excitement. "I think what we really need to look forward to is commercial work here at the Kennedy Space Center, making sure that commercial space is enabled," he said. NASA hopes to see commercial flights from the cape by 2015 or 2016. Their job impact is unknown, but some manufacturing and processing work could be performed at KSC. Before any heavy-lift rocket hardware arrives, KSC's focus is on transitioning former shuttle facilities to support the new vehicle, work already begun under the now-cancelled Constellation program. At pad 39B, the fixed and rotating towers have been dismantled, a new lightning protection system erected and state-of-the-art computer and communication systems installed. A Vehicle Assembly Building high bay must be configured for the big rocket and a mobile launch tower -- originally built to support Constellation's Ares I rocket -- must be modified and outfitted. "All of this construction-type work starts right now," Cabana said. "We're just going to keep on doing what we've been doing, and KSC will be ready when this rocket comes." Web

posted. (2011). [Test flight could bring 2,000 KSC jobs [Online]. Available WWW: http://www.floridatoday.com/ [2011, September 15].]

**September 16: Senate panel OKs $18B for NASA**

A key Senate panel voted Thursday to approve $17.9 billion for NASA in fiscal 2012, a nearly 3 percent drop from this year's funding level but enough to move forward with key science and space exploration priorities. Approval of the spending bill, which now goes to the full Senate for a vote, comes a day after the space agency unveiled its long-awaited $30 billion plan for the mega-rocket it plans to build to reach asteroids and Mars. The bill includes $3 billion for the heavy-lift rocket, which is scheduled for an unmanned test launch in 2017 and an inaugural crewed flight in 2021. That's roughly the amount the House approved earlier this year. The Senate bill also includes $500 million for commercial space operations that will continue flights to the International Space Station in the post-shuttle era. That's about $200 million more than the House approved. The bill also would provide $530 million to continue developing the James Webb Space Telescope, successor to the Hubble Space Telescope and a priority for NASA scientists. That amount could finance a 2018 launch of the telescope from Kennedy Space Center, said Sen. Barbara Mikulski, D-Md., who shepherded funding for the project. The House legislation would provide no money at all for the telescope, even though work on the project has been going on for years. Lawmakers and administration officials had been told the project would cost $1.6 billion and would be launched this year. But the price tag has soared to $8.7 billion with a launch date no sooner than 2018. Web posted. (2011). [Senate panel OKs $18B for NASA [Online]. Available WWW: http://www.floridatoday.com/ [2011, September 16].]

**September 19: NASA Releases Commercial Crew Draft RFP**

NASA unveiled Monday an outline of its acquisition strategy to procure transportation services from private industry to carry U.S. astronauts to low Earth orbit and the International Space Station. The agency also announced the addition of optional milestones for the Commercial Crew Development Round 2 (CCDev2) initiative. NASA's draft request for proposal (RFP) outlines a contract that will be awarded to multiple companies that provide a complete end-to-end design, including spacecraft, launch vehicles, launch services, ground and mission operations and recovery. The Integrated Design Contract (IDC) of up to $1.61 billion will run from July 2012 through April 2014. "This IDC effort will bring us through the critical design phase to fully incorporate our human spaceflight safety requirements and NASA's International Space Station mission needs," said NASA Commercial Crew Program Manager Ed Mango. "We look forward to strong U.S. industry response." Bolden also announced Monday at a speech to the Air Force Association's 2011 Air and Space Conference that NASA will fund optional milestones pre-negotiated as part of some of the original CCDev2 Space Act Agreements (SAA) to help accelerate development. NASA amended Sierra Nevada Corp.'s SAA to include four optional milestones for a total of $25.6 million, bringing the potential value of Sierra Nevada's SAA to $105.6 million, if all milestones are completed successfully. NASA also amended Boeing's SAA to include three optional milestones for a total of $20.6 million, bringing the potential value of Boeing's SAA to $112.9 million, if all milestones are reached. "All four CCDev2 partners are performing very well and meeting their milestones," said Phil McAlister, director of NASA's Commercial Spaceflight Development. "These additional milestones were selected because they sufficiently accelerated the development of commercial crew transportation systems to justify additional NASA investment." Web posted. (2011). [NASA Releases Commercial Crew Draft RFP, Announces CCDEV2 Optional Milestones [Online]. Available WWW: http://www.spaceref.com/ [2011, September 19].]

**Space shuttle launch gantries gone**

The historic space shuttle gantries that for decades stood at Launch Pad 39B at Kennedy Space Center are no more. After more than two years of careful "deconstruction" work, demolition crews told NASA last week that the pad was clean of the fixed and rotating service structures that supported the launch of 53 shuttle missions. Started in 2009 in support of NASA's now-canceled Constellation program and its Ares

rockets, work to clear the towers was focused on converting 39B to a "clean pad," capable of launching different types of manned and unmanned boosters. The pad may now be leased by NASA to companies providing commercial rockets to fly astronauts to the International Space Station. Or, together with its yet-to-be-cleaned twin pad 39A, Pad 39B could also be used to support NASA's recently revealed heavy-lift Space Launch System vehicle. Future rockets launching from Pad 39B will arrive with their own mobile gantries, similar to how the pad got its start more than 40 years ago. First used to launch the Apollo 10 mission on a Saturn V rocket in May 1969, Pad 39B was augmented for the shuttle program with a 267-foot fixed service structure assembled in part from one of the mobile launchers that supported the earlier moon-bound flights. A 130-foot-high, 102-foot-long rotating service structure was also erected to protect the shuttle orbiters from the elements and provide access to their cargo bays. Together, Pad 39B's fixed and rotating towers supported two decades of shuttle launches. The gantries' first shuttle launch was the ill-fated Jan. 28, 1986, mission, which ended 73 seconds into flight with the tragic loss of Challenger and its crew. Fifty-two missions later, Discovery's STS-116 crew became the last to cross the fixed service structure's orbiter access arm and launch on a shuttle from Pad 39B on Dec. 9, 2006. One more rocket lifted off from Pad 39B before the towers were removed. NASA's Ares I-X unmanned test flight launched on Oct. 28, 2009, after new lightning protection towers were erected around the pad and two of the fixed service structure's access arms had been detached, lowered and removed. NASA paid $1.3 million to LVI Environmental Services of New York to remove the historic towers piece-by-piece to avoid damaging the concrete pad foundation. Per the company's contract with the space agency, the gantries' scrap metal was recycled. Web posted. (2011). [Space shuttle launch gantries gone [Online]. Available WWW: http://www.floridatoday.com/ [2011, September 19].]

**September 20: Florida raises concern over Wallops expansion**

In a move to protect their turf, Florida space leaders are sending letters in opposition to a proposed expansion at Wallops Flight Facility in Virginia, warning a move to expand the launch range there could be "duplicative" of work done at Kennedy Space Center. The concern is not without merit. Wallops Flight Facility has a godmother in U.S. Sen. Barbara Mikulski, D-Maryland, who chairs the powerful Senate subcommittee with control of NASA's dollars. If Wallops were to expand its launch capabilities, she likely could steer even more dollars there. It's a situation feared by Florida policymakers, as Kennedy Space Center already is struggling to develop an identity now the space shuttle era has ended. State leaders want Florida to remain the prime provider of orbital flights for NASA for astronauts to the International Space Station. "The most pressing issue for the Florida workforce is the sense of betrayal that their tax dollars might be used in establishing a competing orbital human spaceflight launch capability in another state when they have so well and ably done the job here in Florida," wrote Lynda Weatherman, president and CEO of the Economic Development Commission of Florida's Space Coast. Added Frank DiBello, president of Space Florida, suggested the work could be "duplicative" and raised the possibility of holding a public meeting down in Florida. Web posted. (2011). [Florida raises concern over Wallops expansion [Online]. Available WWW: http://www.orlandosentinel.com/ *the write stuff blog* [2011, September 20].]

**September 22: Shuttle Columbia accident cut plans to retrieve now-falling satellite**

Shuttle astronauts could have retrieved the NASA satellite now expected to rain a half-ton of wreckage on Earth on Friday, but that option was discarded after the 2003 Columbia accident. Just like NASA's flagship Hubble Space Telescope, the 6.5-ton Upper Atmosphere Research Satellite (UARS) was designed in the 1980s with a large, pin-like grapple fixture so the shuttle's robot arm could deploy and retrieve it. The intent was to enable shuttle astronauts to bring the behemoth home at the end of its scientific life. But NASA abandoned that option when the space agency reduced its shuttle mission schedule to a bare-bones minimum after the loss of Columbia and seven astronauts. NASA engineers and astronauts in 2001 reviewed concepts for a shuttle mission to retrieve the 35-foot-long satellite, which is 15 feet in diameter. At least one spacewalk would have been required to safely stow the satellite's power-producing solar wing and other appendages. But the satellite, which was launched on Discovery in 1991,

operated for 14 years -- more than a decade longer than expected. It wasn't decommissioned until 2005 -- a time when NASA still was struggling to return the shuttle fleet to service. As it stands, the UARS spacecraft is expected to reenter the atmosphere this afternoon. Most of the spacecraft will burn up during a fiery plunge back through the atmosphere. But analysts expect 26 pieces weighing a total of about 1,200 pounds to survive and strike Earth. NASA officials and Air Force space surveillance trackers will not know exactly where the debris will fall until the reentry takes place. Web posted. (2011). [Shuttle Columbia accident cut plans to retrieve now-falling satellite [Online]. Available WWW: http://www.floridatoday.com/ [2011, September 22].]

**September 26: ASAP want NASA to avoid "going native" with CCP partners**

NASA's Aerospace Safety Advisory Panel (ASAP) have recommended that NASA personnel embedded at commercial companies should be rotated, in order to avoid them "going native", which they fear threatens rule bending as the teams' working relationship becomes closer over time. Meanwhile, SpaceX are waiting on decision to see if they can combine their next two Dragon COTS missions. Two main arms of commercial association with NASA are currently being worked, with the initial cargo resupply efforts via the CRS (Commercial Resupply Services) contracts and the interim work on the returning domestic US crew capability for the International Space Station (ISS) via the Commercial Crew Development (CCDev) initiatives. In the program which is also known as COTS (Commercial Orbital Transportation Services), SpaceX – with their Falcon 9 launch vehicle and Dragon capsule – are by far the best known commercial company in the public arena, as they aim to build on their cargo resupply progress with the role of launching crew to the ISS. As mentioned, NASA are closely tied in with the main commercial companies, allowing them to monitor on the progress being made on their CRS and CCDev milestones. This embedded approach involves actual NASA managers working alongside the commercial companies in an oversight role. Also known as Partner Integration Teams (PIT), their role was one of the subjects at the ASAP Third Quarterly (2011) meeting, which cited concerns about NASA workers "going native" and becoming too close to their commercial colleagues, which may threaten how objective they are in reporting back to their NASA bosses. "Finding: The Commercial Crew Program (CCP) will utilize embedded PIT members to closely follow and guide commercial partner design processes to help ensure that their result meets NASA expectations and requirements. The Panel recognizes the importance of this method of obtaining insight and encourages it," noted meeting notes, which were sent to NASA administrator Charlie Bolden. "However, caution must be exercised to prevent these government representatives from psychologically and culturally becoming part of the partner's team mentality, or 'going native.'" As such, the ASAP recommends that embedded NASA PITs should be rotated, on a tour of duty cycle, so as to avoid NASA teams getting too close to their assignment. "Recommendation: The Panel recommends that the CCP develop a written policy specifying team rotation schedules based on tour of duty, milestones, or other appropriate criteria, to ensure a fresh set of eyes are always protecting the government's interest for the insight portion of the acquisition strategy. "Rationale: History has shown that buyer representatives embedded with supplier development teams are subject to "bending the rules" to aid the development team that they begin to feel part of. Preplanned rotation is one means of minimizing this effect." Overall, the ASAP appear happy with the roadmap to the commercial companies taking over the main role of LEO – thus allowing NASA to focus on Beyond Earth Orbit (BEO) exploration. Web posted. (2011). [ASAP want NASA to avoid "going native" with CCP partners – SpaceX Latest [Online]. Available WWW: http://www.nasaspaceflight.com/ [2011, September 26].]

**September 27: HuntonBrady to design KSC facility**

NASA chose HuntonBrady Architects in Orlando to design its central campus complex at Kennedy Space Center. The complex will consolidate operations that are currently in multiple buildings. The five-year contract comes with five, one-year options and has a maximum potential value of $25 million. FIGG Bridge Engineers Inc. of Tallahassee got a similar contract for work on renovation and replacement of

bridges at the space center and at Cape Canaveral Air Force Station. Web posted. (2011). [HuntonBrady to design KSC facility [Online]. Available WWW: http://www.bizjournals.com/ [2011, September 27].]

**Minotaur 4 rocket blazes fiery trail into space**

A Minotaur rocket derived from decommissioned nuclear missile parts blasted off at 1549 GMT (11:49 a.m. EDT; 7:49 a.m. Alaska time) today from the Kodiak Launch Complex in Alaska. The launch is carrying a U.S. Navy communications satellite to aid troops deployed in battle zones like Afghanistan and Iraq. This is the 100th launching of an NRL built satellite. Web posted. (2011). [Minotaur 4 rocket blazes fiery trail into space [Online]. Available WWW: http://www.usatoday.com/ [2011, September 27].]

**September 28: Kennedy Space Center sees plan for landmark overhaul**

NASA is taking its first steps this week toward converting 50-year-old Kennedy Space Center into a vibrant modern spaceport where both the agency and commercial companies can operate. With a new era of human space exploration and orbital enterprise opening, NASA started architectural design work Tuesday aimed at building a new $200 million to $300 million Central Campus Complex in the KSC Industrial Area. The landmark NASA Headquarters Building, the Central Instrumentation Facility, several administrative offices and scientific laboratories — all of which played key roles in early U.S. space exploration — ultimately will be torn down while a new pedestrian-friendly hub of green buildings is raised in six phases. "You're talking about facilities that are 50 years old and getting older," said KSC spokesman Allard Beutel. "This is looking ahead to the next 50 years." The idea is to consolidate work in a central hub of modern, energy-efficient buildings that provide safer environments for engineers, managers and administrative personnel. The footprint of NASA facilities in the area will be reduced to 450,000 square feet from 900,000 square feet, returning 35 percent of the land to green open space. NASA engineering studies show the cost of building anew would be less expensive than renovating existing structures, many of which were not designed to meet modern building codes. Among the buildings slated for demolition during the 10-year project: the Auditorium & Training Building and the Occupational Health Facility. NASA's Space Station Processing Facility and the Orion high bay in the Operations & Checkout Facility will remain. Beutel said the new buildings will be less expensive to operate and maintain. NASA expects to save $400 million over 40 years, he said. NASA also plans to refurbish or replace a number of bridges around the 140,000-acre center, which includes the Merritt Island National Wildlife Refuge and Canaveral National Seashore. Among the bridges to be refurbished or replaced: the Indian River and Banana River bridges; the Haulover Canal Bridge, the Jay Jay Railroad Bridge and the State Road 405 bridge than crossed over SR3. Web posted. (2011). [Kennedy Space Center sees plan for landmark overhaul [Online]. Available WWW: http://www.floridatoday.com/ [2011, September 28].]

**September 29: Government Shutdown Averted -- Till Tuesday Anyway**

The House has passed a very short term Continuing Resolution (CR ) to keep the government operating over the weekend. The Senate passed it on Monday so it is now ready for the President's signature. This "bridge" CR, which expires on Tuesday, is necessary because the House is meeting only in pro forma session this week. Very few members are in town. The CR passed by unanimous consent of those who were present. A multi-week CR that lasts until November 18 could be more controversial and House members wanted a more formal debate on that measure. Therefore this CR covers the several days until that can take place. The CRs are needed because none of the 12 appropriations bills that would fund the government for FY2012 has cleared Congress yet. FY2012 begins on Saturday, October 1. Web posted. (2011). [Government Shutdown Averted -- Till Tuesday Anyway [Online]. Available WWW: http://www.spacepolicyonline.com/ [2011, September 29].]

**September 30: House appropriators tell FAA to focus more on air than space**

Earlier this month the transportation subcommittee of the House Appropriations Committee passed a 2012 appropriations bill that included only $13 million for the FAA's Office of Commercial Space Transportation (AST), less than half the administration's request of $26.6 million and below the FY11 level of $15 million. The report accompanying the appropriations bill has recently been released by the committee, and it indicates that appropriators believe the FAA should be focusing its resources more on aviation issues, including air traffic control, than spaceflight. "Given the challenges facing the Federal Aviation Administration with NextGen, safety oversight, rulemaking activities, and the operation of the world's largest 24 hour air traffic control system, the Committee denies the Administration's request for additional staff and resources for this office," the report states, referring to AST. "Given the constrained resource environment that is facing the agency, the FAA can ill afford to divert resources away from core mission activities to this office." The big losers in the House bill are two new initiatives, a Commercial Spaceflight Technical Center in Florida and a proposed $5-million low-cost access to space prize. Neither program would receive any money in the House bill, accounting for most of the difference between the House bill and the administration's request. Web posted. (2011). [House appropriators tell FAA to focus more on air than space [Online]. Available WWW: http://www.spacepolitics.com/ [2011, September 29].]

**NASA Awards Protective Services Contract At Kennedy**

NASA selected Chenega Security & Support Solutions, LLC of Ashburn, Va., to provide protective services at the agency's Kennedy Space Center in Florida. The new firm, fixed price contract begins Dec. 1 with a possible total performance period of four years, 10 months. Phase-in begins as soon as practicable. The maximum potential value of this contract is approximately $151.9 million. This new contract resulted from a competitive small business set-aside. Chenega Security & Support Solutions, LLC will provide protective services at Kennedy including: physical security operations; personnel security; secure access, such as badging; 911 dispatch; firefighting, fire prevention and fire protection engineering; aircraft rescue and firefighting; advance life support ambulance services; emergency management and protective services training. ["NASA Awards Protective Services Contract At Kennedy," **NASA Contract Release #C11-043**, September 30, 2011.]

**NASA Modifies Contract To Continue Ground Operations Work**

NASA signed a $49.4 million contract modification for United Space Alliance (USA) of Houston to continue maintaining and sustaining the ground operations capabilities at the Kennedy Space Center launch facilities in Florida through Sept. 30, 2012. As a result, these critical systems can be used by future space programs. The programs include potential commercial launch vehicle customers, the agency's Space Launch System (SLS) and Orion Multi-Purpose Crew Vehicle that will take astronauts farther into space than ever before, create high-quality jobs here at home and provide the cornerstone for America's future human space exploration efforts. USA has provided this support under the Space Program Operations Contract since 2006. The contract outlines the flight and ground processing and operations requirements. The modification also includes requirements for NASA 21st Century Ground Systems modifications to the Crawler Transporter Number 2, Launch Pad 39B life extension and Vehicle Assembly Building life extension. Work in support of this contract modification is performed at Kennedy and USA's facilities in Cape Canaveral. ["NASA Modifies Contract To Continue Ground Operations Work," **NASA Contract Release #C11-042**, September 30, 2011.]

**NASA Modifies Launch Service Contract To Add Delta II Rocket**

NASA announced the modification of its NASA Launch Services (NLS) II contract with United Launch Services of Littleton, Colo., to add the Delta II rocket launch service in accordance with the contract's on-ramp provision. The modification will enable United Launch Services to offer as many as five Delta II rockets. The NLS II contracts are multiple award, indefinite-delivery, indefinite-quantity contracts with ordering periods through June 2020. The NLS II on-ramp provision provides an opportunity annually for new launch service providers to compete for future missions and allows existing launch service providers

to introduce launch vehicles not currently on their NLS II contracts. The NLS II contracts provide for a minimum capability of delivering agency payloads weighing approximately 550 pounds or more to a minimum 124-mile-high circular orbit with a launch inclination of 28.5 degrees. The launch service providers also may offer a range of vehicles to NASA to meet higher payload mass and orbit requirements. The NLS II contracts support the goals and objectives of the agency's Human Exploration and Operations and Science Mission Directorates. Under the contract, NASA also can provide launch services to other government agencies, such as the National Oceanic and Atmospheric Administration. The Launch Services Program Office at NASA's Kennedy Space Center in Florida is responsible for program management. ["NASA Modifies Launch Service Contract To Add Delta II Rocket," **NASA Contract Release #C11-044**, September 30, 2011.]

## OCTOBER

**October 2: Russia resumed launches of its Soyuz rocket today**

A Soyuz-2 rocket boosted a GLONASS-M navigation satellite into orbit at 20:15 GMT (16:15 EDT) today from Russia's Plesetsk launch site. Everything seems to have gone well according to a report on Ria Novosti. The launch had been scheduled for yesterday (October 1), but was postponed because of bad weather. There are several versions of the Soyuz rocket. The Soyuz-2 used today is similar, but not identical, to the one that failed in August when launching a Progress cargo spacecraft to the International Space Station (ISS). Today's launch is one of two that the Russians are using to recertify the rocket for launching crews to the ISS. Next is another Progress launch later this month on a Soyuz U. If that goes well, Russia plans to launch the next three ISS crewmembers on November 14 on the Soyuz FG version that is used for such missions. Web posted. (2011). [Russia resumed launches of its Soyuz rocket today [Online]. Available WWW: http://www.spaceplicyonline.com/ [2011, October 2].]

**October 3: Former shuttle workers face uncertain future**

By next summer, employment at Kennedy Space Center is expected to fall to its lowest level since before the Apollo program blasted astronauts to the moon more than 42 years ago — a fact that doesn't surprise folks on the Space Coast but still causes many to wince. It has been nearly eight years since then-President George W. Bush announced plans to retire the space shuttle, yet the region still is struggling to find good jobs for thousands of workers whose paychecks disappeared with the end of the shuttle era. NASA officials predict the KSC work force will number roughly 8,200 next year — about half the 15,000 employed there in 2008. A few hundred contractors now are giving the shuttles last rites before they, too, join their former colleagues in a brutal job market. According to Brevard Workforce, which tracks local-employment figures, about 550 out of 5,000 aerospace workers who registered with the agency had found new employment as of June — although officials note the number could be larger because they rely on the workers to self-report. A leading factor contributing to the tough job market is uncertainty at NASA itself. As part of Bush's plans to cancel the shuttle, he ordered NASA to launch a new program to send astronauts back to the moon that would "conduct the first manned mission no later than 2014," he said in 2004. But that program, later dubbed Constellation, was canceled last year, and only in the past month has NASA replaced it with a new exploration program, which now aims to have a first manned mission around 2021 — to a destination yet to be selected. The repeated delays are especially hard on KSC, whose prime purpose has been processing NASA spacecraft for launch. Without launches, there's no need to keep a standing army of technicians; the sharp drop in KSC jobs reflects that reality. "The rough estimates we have, through the summer, is as low as 8,200, although we may have fewer layoffs than that," said KSC spokesman Allard Beutel. KSC employs about 9,000 civil servants and contractors, but that number is expected to fall again next year when the workers responsible for closing out the shuttle program finish their assignment. Those remaining, including about 2,100 NASA civil servants, will continue doing other jobs such as engineering work for other agency programs, launch support for science missions and space-station research. Beutel estimated that employment would pick up again in 2013 when NASA gets closer to debuting its new Space Launch System and that KSC would be "back up to 10,000 employees within five years." Web posted. (2011). [Former shuttle workers face uncertain future [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, October 3].]

**October 4: Next SpaceX test may wait until early '12**

SpaceX's next demonstration flight for NASA is likely to slip to next year, the company says. The launch of a Falcon 9 rocket and unmanned Dragon capsule from Cape Canaveral Air Force Station had been targeted for Nov. 30. But ongoing technical preparations and an uncertain schedule of flights to the International Space Station after a Russian launch failure in August will push the mission back by at least a few weeks. SpaceX has tentatively requested a launch opportunity Dec. 19, but CEO Elon Musk said last week in Washington, D.C., that the mission's timing looks "more like January." Hawthorne, Calif.-

based SpaceX is preparing to deliver cargo to the station under a $1.6 billion NASA contract. A first demonstration flight last December successfully orbited and recovered a Dragon. SpaceX is awaiting NASA's final approval to berth a Dragon at the orbiting research complex on this upcoming flight, paving the way for commercial cargo flights as soon as next spring. Web posted. (2011). [Next SpaceX test may wait until early '12 [Online]. Available WWW: http://www.floridatoday.com/ [2011, October 4].]

**NASA, Space Coast EDC renew partnership**

NASA's Kennedy Space Center and the Economic Development Commission of Florida's Space Coast renewed their economic development partnership. The five-year Space Act Agreement outlines economic development cooperation aimed at supporting NASA's current and future missions. The agreement calls for NASA and EDC senior leaders to meet regularly to discuss economic development matters of mutual interest. In addition, managers from Kennedy Space Center's Center Planning & Development Office will work with the EDC on potential business partnerships and meet with business leaders and committees to address space-related and high-tech economic development. They also will collaborate with the EDC on industry recruitment initiatives seeking targeted space-related and high-tech companies and on targeted industry outreach activities, such as trade shows. They also will promote the commercial use of underutilized facilities at KSC. NASA and the EDC entered into their first economic cooperation agreement in 2005. Web posted. (2011). [NASA, Space Coast EDC renew partnership [Online]. Available WWW: http://www.bizjournals.com/ [2011, October 4].]

**Houston could land shuttle replica**

The future of the orbiter replica Explorer at Kennedy Space Center is uncertain as the scramble for shuttle artifacts and exhibits continues after the fleet's retirement. Controversy surrounding NASA's choice of shuttle retirement homes also is resuming as a New York museum aims to house the prototype Enterprise in a parking lot near a strip club. Explorer, a fixture at the Kennedy Space Center Visitor Complex since the 1990s, might be moved to Houston to make room for the building that will house the real shuttle orbiter Atlantis at KSC. Explorer, located next to shuttle external tank and rocket booster replicas, is a full-scale walk-through exhibit that enables visitors to look into its payload bay and cockpit. KSC spokesman Allard Beutel said talks have been ongoing with Space Center Houston, the visitor complex at NASA's Johnson Space Center. JSC was not awarded an orbiter in April when NASA selected museums to display Discovery, Atlantis, Endeavour and Enterprise. Texans, in particular, felt slighted that Enterprise, which never flew in space, ended up in New York and not the home base of the astronaut corps and mission control. NASA selected the USS Intrepid Sea, Air and Space Museum to house the prototype. But its future is not certain either. The museum planned to house Enterprise in a glass hangar beside the Hudson River. However, the New York Times reported that officials now aim to build a museum in a parking lot in Hell's Kitchen. Located along a busy highway, the lot is bordered by a bag shop, a car wash, storage warehouses and a strip club. Web posted. (2011). [Houston could land shuttle replica [Online]. Available WWW: http://www.floridatoday.com/ [2011, October 4].]

**October 5: NASA Crawlerway Evaluation Earns Award**

A project aimed a ensuring Kennedy Space Center's historic crawlerway will be able to support heavy-lift rockets won an award this week from the American Society of Civil Engineers. Topped by river rock, the 130-foot-wide roadway stretches between the KSC Vehicle Assembly Building and launch pads 39A and 39B. Originally built for the Apollo moon-landing project, the crawlerway also was heavily travelled during the 30-year NASA space shuttle program. With the shuttle program winding to an end, NASA in 2009 put together a team to evaluate the crawlerway and determine whether it will be able to support the weight of a heavy-lift launch vehicle the agency is developing for missions beyond Earth orbit. Potential commercial use of the crawlerway also was evaluated. The two-year evaluation confirmed the crawlerway could do the job in either case. "Putting all of the different entities together has resulted in an outstanding product that the center and the program can stand firmly on," NASA Project Manager Justin Junod said in a statement. The award honors the team's outstanding engineering efforts in research,

design, construction and management, recognizing the complexity of multi-agency coordination and cost-effective engineering advances. Web posted. (2011). [NASA Crawlerway Evaluation Earns Award [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, October 5].]

**Apple's Visionary Redefined Digital Age**

Steven P. Jobs, the visionary co-founder of Apple who helped usher in the era of personal computers and then led a cultural transformation in the way music, movies and mobile communications were experienced in the digital age, died Wednesday. He was 56. Web posted. (2011). [Apple's Visionary Redefined Digital Age [Online]. Available WWW: http://www.nytimes.com/ [2011, October 5].]

**October 7: Kennedy Space Center to build new $300M HQ**

NASA will spend $300 million to turn Kennedy Space Center into a modern spaceport for government and commercial rocket launches. That will involve building a new headquarters complex to replace 50-year-old buildings, roads, bridges and launch pads. The project will "provide job potential through the design, engineering and construction to transition KSC from shuttles to new government and commercial vehicles," said Lynda Weatherman, president and CEO of the Economic Development Commission of Florida's Space Coast. "This complex keeps talent local and enhances our overall competitiveness on the global economic development stage." Web posted. (2011). [Kennedy Space Center to build new $300M HQ [Online]. Available WWW: http://www.bizjournals.com/ [2011, October 7].]

**October 11: NASA Transfers Endeavour Title To California Science Center**

NASA transferred title and ownership of space shuttle Endeavour to the California Science Center (CSC) during a ceremony Tuesday at the center in Los Angeles. The transfer is the first step toward CSC receiving Endeavour in the latter half of 2012. "NASA is pleased to share this wonderful orbiter with the California Science Center to help inspire a new generation of explorers," NASA Administrator Charles Bolden said. "The next chapter in space exploration begins now, and we're standing on the shoulders of the men and women of the shuttle program to reach farther into the solar system." Bolden announced April 12 that CSC was one of four institutions nationwide to receive a shuttle. After display preparation and post-mission work are complete, NASA will deliver Endeavour on the 747 shuttle carrier aircraft to Los Angeles International Airport. From there, the shuttle will be driven through the streets of Los Angeles to its destination at the Science Center in Exposition Park. "Endeavour now will begin its new mission to stimulate an interest in science and engineering in future generations at the science center," California Science Center President Jeffrey Rudolph said. ["NASA Transfers Endeavour Title To California Science Center," **NASA News Release #11-343**, October 11, 2012.]

**KSC chief offers positive vision about the future**

Kennedy Space Center managers this morning offered community leaders a positive vision about the center's post-shuttle future. "We have an awesome future, and we're going to make it happen," Center Director Bob Cabana said at an annual breakfast hosted by the KSC Visitor Complex. That future includes important, unmanned science missions such as the planned November launch of the next Mars rover, the launch of crews to the space station by the middle of the decade and the launch of an exploration mission by 2021. Cabana was addressing several hundred community leaders, business executives, educators, community organizers, and state and local government leaders. Also this morning, Cabana joined NASA Administrator Charlie Bolden for a tour of the 400-foot mobile launcher tower that NASA plans to use for launches of a giant heavy-lift rocket for deep space missions. Built for the cancelled Constellation program's Ares I rocket, the Apollo-style mobile launch platform and tower is expected to be modified to fit the recently announced Space Launch System. Web posted. (2011). [KSC chief offers positive vision about the future [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, October 11].]

**Next Delta 4 rocket to boost military communications**

The United Launch Alliance Delta 4 rocket that will deploy a vital communications satellite for U.S. military forces overseas was placed atop its Cape Canaveral pad this week. Liftoff is targeted for January 19 to deliver the Air Force's fourth Wideband Global SATCOM spacecraft into orbit and continue ongoing efforts to upgrade the military's main communications infrastructure. Each WGS has 10 times the capacity of the aging Defense Satellite Communications System spacecraft they are replacing. The satellites supply communications such as maps and data to soldiers on the battlefield, relay video from unmanned aerial reconnaissance drones, route voice calls and data messaging, and even offer quality-of-life considerations like television broadcasts and email delivery to the troops. The bright orange and white rocket, stretching 170 feet long, emerged from the Horizontal Integration Facility at 4:30 p.m. EDT Monday. Riding a 36-wheel, diesel-powered transporter, the Delta took an hour-long trip down the road and up the pad's ramp to Cape Canaveral's Complex 37. Initial assembly of the rocket, including mating of the cryogenic upper stage with the Common Booster Core first stage using a precision laser alignment system, had been completed inside the Horizontal Integration Facility over the past couple of months. After the vehicle arrived at the base of the pad, technicians went to work Monday evening getting equipment ready to raise the rocket vertically. The pallets cradling the Delta were tied down to the Fixed Pad Erector and the transporter used to drive the rocket to the pad disengaged to pull away. The erector system and its hydraulic pistons then lifted the rocket upright at 10 a.m. EDT Tuesday, setting the vehicle atop the pad's launch table within 20 minutes. Workers later unhooked the booster from the cradles, allowing the erector platform along with the pallets to lower back to the ground at 5 p.m. Over the next three months at Complex 37, a full pre-launch test program and the final rocket assembly steps will be carried out, including installation of the four strap-on solid-fuel motors to the first stage and attachment of the payload. WGS 4 is scheduled for shipment from Boeing satellite manufacturing factory in Los Angeles to Cape Canaveral on November 14 to undergo checkouts and fueling before joining its rocket at the pad. When fully stacked and its nose cone in place, this Delta 4 Medium+(5,4) rocket will tower 217 feet tall. It will be 358th launch of a Delta rocket since 1960 and the 18th for the Delta 4 program since 2002. Web posted. (2011). [Next Delta 4 rocket to boost military communications [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, October 11].]

**October 12: NASA, KSC chiefs promise bright future for Space Coast**

Kennedy Space Center's new 400-foot mobile launch tower became the butt of jokes when the rocket it was built for was canceled. Critics suggested it could serve as a bungee jumping attraction, if not a platform to send astronauts to space. But Tuesday, senior NASA officials pointed to the $290 million tower as a symbol of the center's bright post-shuttle future. It will be modified to support a different rocket NASA recently announced it would build for human exploration missions. "I believe we have an outstanding future," KSC Director Bob Cabana told reporters before a rain shower forced the group to take shelter under the tower's base. "We are moving forward. We've made tremendous progress." Cabana, NASA Administrator Charles Bolden and senior KSC managers presented the same message to hundreds of community leaders during an annual breakfast at the KSC Visitor Complex. After years of uncertainty about NASA's direction, the trauma of the shuttle program's last flight in July and thousands of associated layoffs, the managers focused on what they said was finally a clear path forward. "I don't know of a time that the Kennedy Space Center has seen such dynamic change since the end of the Apollo program," Cabana told community leaders. The new path envisions KSC and Cape Canaveral Air Force Station as a bustling hub for launches of both NASA's exploration missions and commercial missions flying people and satellites. For the first time, KSC is the lead center for management of a major human spaceflight program. The Commercial Crew Program is charged with helping private companies design and build systems to fly astronauts, and certifying their safety. "It isn't just for NASA. We want to create a capability that anybody can use," said Ed Mango, the program manager. "The goal is in a generation or two, our grandkids would be able to fly to low Earth orbit just like we want to fly from here to Paris, or from here to Tokyo." NASA wants the commercial systems ready by late 2016, or sooner if possible with limited funding. Those systems will create opportunities for commercial work in and around KSC, Mango said, and "that means more jobs." Another new KSC office is responsible for preparing facilities like the

Vehicle Assembly Building, launch pad 39B and the mobile launcher to handle the giant rocket NASA plans to build for human exploration of the moon, an asteroid or Mars. A first unmanned test flight of the Space Launch System is planned for 2017. Available space in the assembly building, former shuttle hangars and other facilities will be offered to commercial users. "That is something that has not been done before at KSC," said Pepper Phillips, head of the 21st Century Ground Systems Program. The mobile launch tower that will carry the heavy-lift rocket, begun under the now-canceled Constellation program, represents a shift to a "clean pad" concept for processing rockets that could enable pad 39B to support other kinds of rockets. From a recent peak of about 15,000 contractors and civil servants, KSC's employment is expected to dip close to 8,000, then around 2013 start a gradual buildup back to 10,000. Cabana warned employees of "tough fiscal times" and said people at the center would have to "tighten our belts a little bit" in the coming year, putting off some preventative maintenance and forgoing some quality-of-life perks. Bolden acknowledged a "long, difficult road ahead" but promised KSC would thrive again. Web posted. (2011). [NASA, KSC chiefs promise bright future for Space Coast [Online]. Available WWW: http://www.floridatoday.com/ [2011, October 12].]

**Virgin Galactic hires former NASA exec**

Virgin Galactic has hired a former NASA executive to oversee its Spaceport operations in southern New Mexico. The company Tuesday announced it has appointed Michael Moses as its vice president of operations. Moses comes from NASA's recently retired space Shuttle program, where he served at the NASA Kennedy Space Center in Florida as the launch integration manager from 2008 until the landing of the final Shuttle mission in July 2011. Moses also served as chair of the Mission Management Team, giving ultimate launch decision authority for the final 12 missions of the Space Shuttle Program. Virgin Galactic, owned by Sir Richard Branson's Virgin Group and Aabar Investments PJS, is on track to be the world's first commercial spaceline. It hopes to launch its first flight within the next year. Web posted. (2011). [Virgin Galactic hires former NASA exec [Online]. Available WWW: http://www.alamogordonews.com/ [2011, October 12].]

**NASA 'confident' Russia's Soyuz rocket safe**

The head of manned missions for NASA told a congressional panel Wednesday his agency is confident Russian engineers can safely and reliably transport astronauts to the International Space Station despite the Aug. 24 failure of a Russian rocket. William H. Gerstenmaier told members of a House Science, Space and Technology subcommittee the Russians have kept NASA "well-informed" about the incident, appear to have zeroed in on the cause, and have taken important steps to prevent future problems. "NASA's confident that our Russian partners identified the most likely failure cause and have a sound return-to-flight plan," Gerstenmaier, associate administrator for Human Explorations and Operations, told lawmakers. Wednesday's congressional hearing was the first held on the crash of the unmanned Progress 44 cargo ship that was carrying nearly 3 tons of supplies to the space station. Russian investigators have traced the cause to a low fuel feed to the third-stage engine's gas generator, a problem most likely triggered by contamination during testing. The failure was significant because the third-stage engine is similar to one used in Russia's Soyuz FG launchers that propel crews to the space station. And the Soyuz is the only crew transport available now that NASA's shuttle program has ended. NASA inspectors agree with the conclusion and support the Russian space agency's decision to add inspectors and to videotape "critical actions related to component assembly" to improve safety, Gerstenmaier told the panel. A Soyuz rocket with three crew members, including an American, is scheduled to launch Nov. 14, headed for the space station. Another will launch Dec. 26. Web posted. (2011). [NASA 'confident' Russia's Soyuz rocket safe [Online]. Available WWW: http://www.floridatoday.com/ [2011, October 13].]

**October 13: Mars rover rocket fueled for practice countdown**

Launch teams today are fueling an Atlas V rocket in a dress rehearsal for next month's planned launch of one of NASA's highest-profile science missions, the next Mars rover. The United Launch Alliance rocket on Wednesday was rolled from its vertical hangar to the pad at Cape Canaveral Air Force Station's

Launch Complex 41, and its first stage filled with 25,540 gallons of highly refined kerosene. Today, oxidizer will be added to the first stage (25,540 gallons) and Centaur upper stage (4,150 gallons) along with liquid hydrogen in the Centaur (12,680 gallons). With no spacecraft and payload fairing yet attached, the topless rocket measures about 148 feet tall. The so-called "wet dress rehearsal" was set to begin around 7:15 a.m. today and culminate in a simulated "T-0" around 1 p.m. Once the test is complete, the cryogenic propellants will be offloaded. The rocket will roll back to its processing tower Friday. Separately, crews at Kennedy Space Center continue to process the compact car-sized rover named Curiosity for a targeted Nov. 25 launch. The spacecraft is expected to be moved to the pad around Nov. 2. Web posted. (2011). [Mars rover rocket fueled for practice countdown [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, October 13].]

**Florida transportation plan deletes KSC upgrades**

An anticipated $15 million in annual state funding to upgrade Brevard County's space launch facilities — and create aerospace jobs — may fall victim to the budget ax. The Florida Department of Transportation's draft work program for 2013-17 omitted this space-infrastructure funding. Potential projects include revamping launch complexes 40 and 46 at Cape Canaveral Air Force Station for commercial uses. Thursday, Space Coast Transportation Planning Organization members expressed alarm during a meeting at the Government Center in Viera. Why was the money taken off the priority list? Statewide gasoline tax revenues are projected to tumble $897 million this year because of the sour economy, people driving less because of high gas prices and a surge in fuel-efficient vehicles, Mary Schoelzel, a DOT manager, said. In July, the TPO requested funding for a list of projects including work on the Air Force launch pads, NASA Orbiter Processing Facility upgrades, commercial heavy-lift launch complex work, and hangar improvements at the Shuttle Landing Facility. David Pierce of the Kennedy Space Center planning and development office; Patrick McCarthy, Space Florida's director of spaceport operations; and Tim Franta, a Florida Tech space consultant, lobbied Thursday for the $15 million space earmark. McCarthy cited competition from other states, particularly Virginia's interest in supporting human spaceflight missions at NASA's Wallops Flight Facility. DOT's District 5 encompasses Brevard and eight other Central Florida counties. By 2017, the district's sole highway projects earmarked for funding will be the Wekiva Parkway in Orange and Lake Counties and the addition of toll lanes on Interstate 4, TPO records show. Rockledge Mayor Larry Schultz, who serves as TPO chairman, quipped that "we ought to be praying for money from heaven" for Brevard highway dollars. Web posted. (2011). [Florida transportation plan deletes KSC upgrades [Online]. Available WWW: http://www.floridatoday.com/ [2011, October 14].]

**October 14: Test flights for Orion at KSC on tap for '13**

NASA is gearing up for two flight tests of the spacecraft being designed to carry U.S. astronauts into deep space. The space agency soon will decide which to launch first: an atmospheric re-entry test or a low-altitude emergency escape mission. Regardless of the order, both unmanned flight tests will be launched from the Space Coast to certify the Apollo-style capsule for human expeditions beyond Earth orbit. The first test is targeted for launch in late 2013 or early 2014. The second would follow in 2015 or 2016. NASA spaceflight Chief William Gerstenmaier was briefed this week on the two options. The atmospheric re-entry test might be flown first because the Orion capsule for that mission then could be re-used for the low-altitude abort test. "Within the next two months, I expect him to make a choice," said NASA Orion Program Manager Mark Geyer. A holdover from the canceled Project Constellation moon program, the Orion spacecraft is being designed to fly atop NASA's Space Launch System, a heavy-lift launch vehicle similar to the Saturn V moon rocket developed for the Apollo program. An initial unmanned Orion test flight on the new super-sized Space Launch System is proposed for 2017, with human expeditions beyond Earth orbit beginning in 2021. The two upcoming flight tests follow a 2009 launch-pad abort test performed at White Sands Missile Range in New Mexico. The intent is to show Orion can be safely flown during two of the most critical periods of a mission. The first stage of a Peacekeeper Intercontinental Ballistic Missile will blast off from Launch Complex 46 at Cape Canaveral

Air Force, propelling an Orion capsule over the Atlantic Ocean. The capsule will encounter maximum aerodynamic pressure about a minute into flight. At that point, the Orion launch abort system will be activated. Powerful motors on an escape pole will pull the spacecraft away from the Peacekeeper. Parachutes will open and float the Orion to a splashdown in the ocean. An Orion spacecraft will blast off from Cape Canaveral Air Force Station aboard either a United Launch Alliance Delta IV Heavy or Atlas V rocket. The rocket will propel the spacecraft to an altitude of about 4,600 statute miles, and Orion will reach a speed of about 20,400 mph. That's about 85 percent of the 24,000 mph the capsule would reach during an atmospheric re-entry after a moon mission. The idea is to test the spacecraft's heat shield and its guidance, navigation and parachute systems during a return to Earth on a lunar trajectory — a much more dynamic environment than a return from a mission in low Earth orbit. The Orion spacecraft would splash into the Pacific Ocean off the U.S. West Coast. A Pacific splashdown enables a returning crew to jettison the Orion Service Module over the ocean rather than a populated area in the continental U.S. A landing in the Atlantic Ocean would require the latter. A team from NASA's Kennedy Space Center would perform the Orion recovery operation. NASA contractor Lockheed Martin will begin delivering Orion spacecraft components for the first test in fall 2012. The Orion capsule will be assembled in the west wing of the Operations and Checkout Building at KSC. Web posted. (2011). [Test flights for Orion at KSC on tap for '13 [Online]. Available WWW: http://www.floridatoday.com/ [2011, October 14].]

**October 17: DOD's proposed bulk buy of Atlas, Delta rockets**

A watchdog report expected to be released today could influence how the government buys rockets for launches of critical national security payloads, an issue with potentially long-term ramifications for companies with neighboring Cape Canaveral launch pads. The Department of Defense plans a bulk purchase of United Launch Alliance's Atlas and Delta rockets, which the company says offers the best deal to taxpayers and its suppliers. But SpaceX says such a large-scale purchase would effectively shut it out of that market for a decade, limiting competition and wasting money. Congress asked the U.S. Government Accountability Office to review the plan to buy 40 ULA boosters over five years, starting in the 2013 budget year. The report was delivered last month and is now set for public release. Cristina Chaplain, the report's author, would not comment on its findings but said her office assessed whether the Department of Defense understood ULA's costs, the industrial base and opportunities for competition well enough to justify a long-term contract. So-called block purchases of equipment by the military are not unusual, she said, but the proposed rocket deal is notable for its size. The Air Force has requested nearly $10 billion for ULA boosters between 2012 and 2016. The National Reconnaissance Office, whose budget is not disclosed, would spend billions more in that period. NASA is not involved in the deal, though ULA launches many of the space agency's most important science missions, including a Mars rover targeted to blast off from the Cape next month on an Atlas V. ULA says a bulk purchase would better leverage the government's buying power and provide needed stability to its industrial base. ULA's Atlas V and Delta IV rocket families are the only ones currently certified to fly large, high-value national security satellites. The two rockets have launched 29 missions since late 2006, when ULA began operations as a 50-50 joint venture between The Boeing Co. and Lockheed Martin Corp. But SpaceX, already under contract to launch NASA cargo to the International Space Station and for a slate of commercial payloads, wants a chance to compete for military launches. A five-year deal for ULA would mean SpaceX couldn't compete for those missions until 2018 and fly them for about a decade. The Air Force says its internal studies have encouraged block buys to control costs, but it is looking at a range of options and has made no decision. Web posted. (2011). [DOD's proposed bulk buy of Atlas, Delta rockets could ground SpaceX plans [Online]. Available WWW: http://www.floridatoday.com/ [2011, October 17].]

**October 18: Florida Cabinet vows support of KSC**

Saying Florida faces predatory competition from other states for space-launch business, Florida Agriculture Commissioner Adam Putnam Tuesday suggested that Kennedy Space Center be run by an authority separate from NASA that could make decisions locally, including development of some land

now reserved as a wildlife refuge. Putnam's call came as the Florida Cabinet met at the KSC Visitors Complex and heard presentations on the center's future as a multi-use space port, supporting NASA, commercial and military launches. In a roundtable discussion that followed, members also heard space industry executives urge that business at KSC needs to be easier and quicker to arrange. "I think it's our responsibility as the cabinet to help develop a vision," Putnam said. "It's worth exploring options for the governance structure of this site so that we can be nimble and agile and close deals." Putnam argued that under NASA and Congress, KSC's funding and future role are jeopardized by politics, particularly with other states wanting their own space ports. Private firms are building spaceports in Texas and New Mexico, while NASA is considering funding construction of one at Wallops Island, Va. Meanwhile, the retirement of the space shuttle leaves NASA – and KSC – without a government-owned rocket to launch. "That creates an opportunity for vultures from other states to try and come take what we've got," Putnam said. "We can't let that happen." Putnam also said he would like to see a study done of the thousands of acres of land at KSC set aside for preservation to see if any could be made available for space-related development. Lt. Gov. Jennifer Carroll, who chairs Space Florida, the public-private corporation that promotes space development, responded that more than 1,000 acres already are available. She told the cabinet that NASA's commitment to KSC appears strong – the agency plans to spend hundreds of millions of dollars to modernize the facility, if Congress appropriates the money -- but that only "one or two" members of the state's congressional delegation have shown strong fight for the Florida space center. She said she and the space industry need to do a better job convincing other members. KSC Director Bob Cabana, who participated in the roundtable, said later that "there are no changes here in the near future" relating to control of Kennedy. But he said that "many, many years in the future," he expects space ports to operate more like airports. The cabinet also includes Gov. Rick Scott, Attorney General Pam Bondi and Chief Financial Officer Jeff Atwater. All appeared to agree at least with Putnam's desire for more Florida influence over KSC' future. Atwater said the message he got from business leaders was: "Make it easier." Web posted. (2011). [Florida Cabinet vows support of KSC [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, October 18].]

**Ex-NASA official hired by UCF**

A former NASA associate administrator for science, S. Alan Stern, has been named director of the Florida Space Institute at Kennedy Space Center. Stern will help the institute, a part of the University of Central Florida, develop projects with NASA and the space industry in the post-shuttle era – including unmanned flights, commercial flight, science missions and technology development. At NASA in 2007 and 2008, Stern led NASA's Science Mission Directorate, leading research and scientific exploration programs for Earth studies, space weather, the solar system and the universe beyond. Web posted. (2011). [Ex-NASA official hired by UCF [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, October 18].]

**October 19: Houston receives "white room" from KSC pad**

Houston may not have received a retired NASA orbiter, but it now has a key piece of a dismantled Kennedy Space Center launch pad to showcase. CollectSPACE Editor Robert Pearlman reported that the orbiter access arm removed from launch pad 39B, one of two former shuttle pads, had arrived at NASA's Johnson Space Center. The "white room" at the end of the arm was a shuttle crew's last stop before boarding an orbiter for launch. Space Center Houston is building a facility to display the access arm and other important shuttle program artifacts, and Explorer, a shuttle mockup now on display at the KSC Visitor Complex. KSC will display the orbiter Atlantis. Web posted. (2011). [Houston receives "white room" from KSC pad [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, October 19].]

**October 20: NASA: Back space taxis or pay more for Russian rides**

An extra year of buying rides for astronauts to the International Space Station will cost the United States $450 million -- money that would be better spent speeding development of private space taxis, NASA's deputy administrator said Thursday. With the retirement this summer of the space shuttles, the United

States is dependent on Russia to fly astronauts to the space station, a $100 billion project by 16 nations that orbits about 225 miles above Earth. Russia charges more than $50 million per person for rides on its Soyuz capsules. NASA so far has spent $388 million to bolster the derequested amount, it gives us the best chance to be able to replace this foreign government service by 2016. That's the choice," she said. Overall, commercial space transportation and related industries generated more than $208 billion of economic activity and more than $53 billion in profits in the United States in 2009, a Federal Aviation Administration report released in January 2011 shows. "That economic impact is only expected to grow," Garver said. Web posted. (2011). [NASA: Back space taxis or pay more for Russian rides [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, October 20].]

**October 24: New tour includes stop inside Vehicle Assembly Building**

Kennedy Space Center Visitor Complex is creating a tour that includes the opportunity to walk inside the Vehicle Assembly Building, the structure where space shuttles were assembled for launch. Very few people, aside from astronauts and NASA personnel, have been inside the 525-foot VAB in recent years. The new KSC Up-Close tour will be offered eight times daily for a limited time beginning Nov. 1. For a very limited time, tour guests may see a space shuttle inside the VAB as its prepared for future display in Los Angeles, Washington, D.C. or Florida. (The shuttle Atlantis will be displayed at KSC beginning 2013.) Other stops on the two-hour KSC Up-Close tour will include NASA's KSC Headquarters; the Operations & Checkout building which was the astronaut crew quarters before each launch and where they boarded to Astrovan to ride to the launch pads; the NASA Causeway and its panoramic view of the area and the coast; the Crawlerway, the wide route that led shuttles to the launch platform; Orbiter Processing Facilities, where orbiters were processed and maintained between flights; the Solid Rocket Booster Storage Areas; the famed countdown clock; and more. Web posted. (2011). [Kennedy Space Center: New tour includes stop inside Vehicle Assembly Building [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, October 24].]

**October 25: Astronaut Scholarship Foundation: Annual Autograph Show**

It all started – with seven. The original seven Mercury astronauts that is. They wanted to give back to the nation that had allowed them to reach the heights that they had achieved, while at the same time inspiring the nation's young to follow in their footsteps. What arose was the Astronaut Scholarship Foundation (ASF). There are more than 80 astronauts that are working with the ASF to ensure that the United States maintains its role as leader in terms of science and technology. The ASF accomplishes this by providing scholarships to students studying engineering, science and math. In 1984, the then six surviving Mercury astronauts established the 501 (c) 3 organization along with the widow of the seventh (Betty Grissom, widow of astronaut Virgil "Gus" Grissom. Astronauts Malcolm Scott Carpenter, L. Gordon Cooper Jr., John H. Glenn Jr., Walter M. Schirra, Alan B. Shepard Jr., and Donald K. (Deke) Slayton were also joined by the Mercury Program's flight surgeon William Douglas M.D. as well as a local business man, Henry Landwirth. What started with scholarships of only $1,000 has grown to $10,000 each. Twenty-six of these scholarships are handed out every year for a grand total of $260,000. All total? The ASF has handed out $3 million in scholarships to worthy students. The ASF's current Chairman of its Board of Directors is Apollo 16 Command Module Pilot Charlie Duke; his vice-chair is shuttle veteran Dan Brandenstein. The ASF raises funds by a number of means. Astronaut guest appearance, fund-raisers, donations from different entities both public and private and autograph shows. The next of these is scheduled to take place at the Kennedy Space Center Visitor Complex located in Florida from Nov. 4-6. The annual show contains a wide range of events and tours to allow guests the opportunity to learn about the location's history while picking up a signed item from an astronaut. Web posted. (2011). [Astronaut Scholarship Foundation: Annual Autograph Show To Raise Funds For STEM Education [Online]. Available WWW: http://www.americaspace.org/ [2011, October 25].]

**Dollar gap may delay flights**

The post-shuttle "gap" in astronaut launches from Florida could extend to 2017 if Congress doesn't boost funding for commercial space taxis, NASA warns. The U.S. will depend on Russia for access to the International Space Station until one or more commercial vehicles are ready. But lawmakers so far have offered hundreds of millions less than NASA requested for the commercial effort in 2012, with six times as much going to a deep space exploration system that won't fly a crew for a decade. If development of commercial spacecraft is slowed, reliance on the Russians — at a cost of roughly $60 million per seat — would be prolonged. Today, executives from five companies interested in flying astronauts commercially, and NASA's head of human spaceflight and inspector general, will discuss their progress and challenges before the U.S. House science committee. Chief among the challenges is funding, which ranges from $312 million proposed by the House to $500 million by the Senate. Both options are well below the Obama administration's request for $850 million in the 2012 budget and subsequent years. It was based on the president's request that NASA's Commercial Crew Program laid out plans to certify multiple commercial space-transport systems to resume human launches from Cape Canaveral by late 2016 — about five years after the last shuttle mission. Companies including The Boeing Co. Sierra Nevada Corp. and SpaceX said they could be ready sooner. Records show the commercial Crew Program, led by Kennedy Space Center, identified funding as its top risk well before the last shuttle mission this July. "The top risk is inadequate funding -- it is not clear that the budget that is currently available will support commercial crew transport to the (space station) by 2016," read minutes from a May 24 meeting of the NASA Aerospace Safety Advisory Panel, which was briefed by NASA managers a day earlier. Another independent review panel, the NASA Advisory Council, expressed concern this summer about the timetable for developing commercial crew taxis. NASA could proceed with limited funding for the commercial vehicles, but impacts could be a longer gap between flights or less competition, which is considered important to keeping costs down and sparking other markets. Instead of supporting work on three spacecraft next year and picking two finalists, NASA might trim the field to two development projects and one ultimate winner. Web posted. (2011). [Dollar gap may delay flights [Online]. Available WWW: http://www.floridatoday.org/ [2011, October 25].]

**October 26: Adequate Funding Key to Commercial Crew Timing**

The overriding message from government and private sector witnesses at yesterday's hearing on NASA's commercial crew program is that "adequate" funding will determine how quickly such systems can be ready to take astronauts to the International Space Station (ISS). The message from most members of the House Science, Space and Technology Committee in return is that they remain skeptical that there is a market for commercial crew services other than NASA to help defray the costs. Their concern is that the government will end up paying dearly for those services in addition to the billions of dollars it plans to invest in development costs. The commercial crew program, initiated by President Obama in February 2010, is a public-private partnership where NASA and private sector companies share the costs of developing new crew transportation systems to low Earth orbit (LEO), including the ISS. The systems would be operated by the companies, not NASA. NASA would pay the companies to take astronauts to the ISS while the agency focuses on developing a new system to take astronauts further into space. With the termination of the space shuttle program earlier this year, NASA does not have the capability to launch anyone into space today. It pays Russia to take astronauts to the ISS. Several committee members expressed concern about the overall cost to the taxpayer, which is a combination of the government's share of the development costs and payments for services once the systems are operating. Although many members have expressed reservations in the past about being reliant on another country for human access to space, the concern at this hearing was that it would cost much more for the commercial crew option than continuing to pay Russia. The United States is committed to using the ISS only until 2020. If the commercial systems are not ready until 2016 or 2017, their utility for ISS operations is limited. Committee members wanted to know if U.S. commercial systems would be competitive with Russia's prices if the development costs are included in the calculation. Web posted. (2011). [Adequate Funding Key to Commercial Crew Timing [Online]. Available WWW: http://www.spacepolicyonline.com/ [2011, October 26].]

**Boeing's spaceship to be assembled at Kennedy Space Center**

The Boeing Co. next week will confirm plans to assemble a commercial space capsule in one of the former shuttle hangars at Kennedy Space Center, work that could create more than 500 jobs. The company on Tuesday emailed invitations to VIP guests for a 10 a.m. Monday event at a hangar that formerly housed the orbiter Discovery. The invitation from John Elbon, head of Boeing's space exploration division, promises a "milestone commercial space event." The spacecraft is one of four whose development NASA is helping to fund under a program that hopes to launch astronauts to the International Space Station from U.S. soil again by the middle of the decade. Boeing plans to launch the capsule from Cape Canaveral Air Force Station atop a United Launch Alliance Atlas V rocket. NASA is expected to transfer the hangar officially called Orbiter Processing Facility Bay 3 to Space Florida, which would lease it to Boeing, according to a source knowledgeable about the deal. No other details were immediately available, but Boeing and Space Florida, the state's aerospace economic development agency, both confirmed an agreement had been reached to use NASA facilities at KSC. Space Florida expects the capsule work to create 550 jobs by 2015. The space center in January announced its intent to make former shuttle facilities available to commercial users if NASA no longer needed them. NASA leaders hinted a deal for one of the three shuttle processing hangars was near even before the last shuttle mission in July, but it took months longer to complete. Web posted. (2011). [Boeing's spaceship to be assembled at Kennedy Space Center [Online]. Available WWW: http://www.floridatoday.com/ [2011, October 26].]

**October 27: Super-rocket to use mobile launcher, shuttle crawlers**

NASA intends to upgrade one of its Apollo-era treaded crawlers and an inactive mobile platform built for the canceled Ares launcher program to support the agency's colossal super-rocket, officially called the Space Launch System, in time for a test flight in 2017. The modifications are part of up to $2 billion of work to prepare the Kennedy Space Center for the new heavy-lift rocket, which will initially be powered off the launch pad by three space shuttle main engines and two five-segment solid rocket boosters also derived from the shuttle program. Although questions about its cost still linger, NASA plans to spend $10 billion to design and develop the Space Launch System for its first unmanned flight in 2017. Assuming the launcher is fully funded and remains near cost projections, it will be able to lift 70 metric tons, or about 154,000 pounds, into low Earth orbit on its first mission. The $500 million launch platform built for the Ares 1 rocket is being tapped for the much more powerful Space Launch System. Declared structurally complete in January 2010, the mobile launch pad will have to be altered to support the heavier weight and additional thrust of the heavy-lifter, according to NASA officials. One of NASA's crawler-transporters will be made ready to haul the massive rocket and mobile platform between the Kennedy Space Center's Vehicle Assembly Building and launch pad 39B. Larry Schultz, the mobile launcher project manager, said the biggest changes will be on the platform's base, where engineers will increase the size of a 22-square-foot exhaust duct and strengthen the surrounding structure. The SLS will weigh more than twice as much as the planned Ares 1 rocket. The thrust cutout will be expanded to a rectangle stretching 60 feet by 30 feet, according to Shultz. The modifications will be complete by 2016. The 390-foot-tall Ares mobile launcher was being eyed as the launch platform for the commercially-developed Liberty rocket proposed by ATK, the contractor for the Ares 1's first stage and the space shuttle and SLS solid rocket boosters. Resembling the Ares 1, the Liberty rocket would combine a five-segment solid motor first stage with a second stage from EADS Astrium based on the core of the European Ariane 5 launcher. According to Bob Cabana, director of the Kennedy Space Center, the Ares platform will be solely used by the Space Launch System. Cabana said the space shuttle's mobile launch platforms, which date back to the 1960s, could be available to commercial users interested in launching from KSC. Unlike the shuttle platforms, the Ares/SLS mobile launcher features a 345-foot-tall tower on top of a 45-foot-tall base. The tower would provide access to various levels of the rocket during assembly and launch operations. Pepper Phillips, program manager for 21st century ground systems at KSC, said engineers will "up-rate" the capacity of one of the two crawlers at the spaceport. "For the time being, we are 'up-

rating' the load capacity of one of the crawlers so that it can handle the heavier loads associated with the SLS," Phillips said. "We will perform some minor life extension mods to the second [crawler] to keep it in service." Crawler-Transporter No. 2 will receive steel stiffeners and braces to address overstressed structural areas, increasing its lift load to 18 million pounds and extending its service life another 20 years, according to Amber Philman, a NASA spokesperson. The top of a crawler is 90 feet on each side, the size of a baseball infield. It weighs about 6 million pounds by itself and has a top speed of 2 mph when empty. Other upgrades will made to the crawler's jack, elevation and leveling system, which uses hydraulic actuators to keep rockets level on the four-mile journey between the VAB and the launch pad, including the trip up the incline to the pad surface. The diesel-powered crawler's roller bearings have reached the end of their fatigue life and will also be replaced. In its most powerful configuration, the Space Launch System will tower 400 feet tall and weigh 6.5 million pounds, making it the largest rocket ever built. The space shuttle weighed 4.5 million pounds at liftoff. Web posted. (2011). [Super-rocket to use mobile launcher, shuttle crawlers [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, October 27].]

**October 28: Venerable Delta 2 rocket launch flawless again**

Not knowing if the future will bring it more launch business, the workhorse Delta 2 rocket successfully deployed a vital climate and weather observatory this morning before riding into an uncertain state of limbo. The United Launch Alliance-made rocket, one of the world's most reliable space boosters ever built, pierced a star-filled sky for its middle-of-the-night ascent to deploy the NPP spacecraft. Liftoff occurred from Vandenberg Air Force Base along California's central coastline at 2:48 a.m. PDT (5:48 a.m. EDT; 0948 GMT). NPP is flying five instruments, including four that are advanced versions from previous eras. The sensors will be evaluated on NPP for their inclusion in the future program that hopes to begin launching NOAA's new-era observatories in 2017. Web posted. (2011). [Venerable Delta 2 rocket launch flawless again [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, October 28].]

**October 30: Progress launch eases station concerns**

Three crew members are on track for a Nov. 13 launch to the International Space Station that would ensure the outpost isn't left untended for the first time in more than a decade. Sunday's successful flight of an unmanned Russian cargo ship, the first since one failed to reach orbit in August, demonstrated it was safe to resume launches of people on similar rockets. NASA officials congratulated the Russians in a statement released after the 6:11 a.m. launch from the Baikonur Cosmodrome in Kazakhstan. Web posted. (2011). [Progress launch eases station concerns [Online]. Available WWW: http://www.floridatoday.com/ [2011, October 30].]

**October 31: Boeing to build space capsules at KSC**

The Boeing Co. announced this morning that it will assemble and operate its commercial manned space capsule from Kennedy Space Center, bringing 550 jobs to the space coast by 2015. Gov. Rick Scott along with officials from Boeing, NASA and Space Florida gathered to announce the details of the plan to support Boeing's CST-100 space capsule program at a 10 a.m. ceremony at KSC. Space Florida, the state's space development agency, leased from NASA one of the orbiter processing facilities that had supported space shuttles for 30 years before that program ended in July. The hangar-like garage will be subleased to Boeing to be the headquarters for the CST-100. Boeing expects to employ 140 people by June 2013 and peak at 550 by the end of 2015 when Boeing expects to launch test flights. Web posted. (2011). [Boeing to build space capsules at KSC [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, October 31].]

## NOVEMBER

**November 1: Mingle with astronauts at KSC complex**

This weekend is your chance to mingle with space heroes. More than 35 astronauts and special guests representing every era of America's space program will be at the Astronaut Autograph & Memorabilia Show. "The show offers everyone the opportunity to actually meet American space legends, men and women who have left Earth, some who even walked on the surface of the moon, in a setting that is very laid back and inviting," said Linn LeBlanc, executive director of the astronaut Scholarship Foundation, which puts on the annual event. The event, which lasts two days, includes astronaut lectures, space memorabilia and of course a chance to get astronauts' autographs and even photographs. Proceeds from the show, dinner and auction go to the nonprofit Astronaut Scholarship Foundation, which provides college scholarships to science, technology, engineering and math students. Web posted. (2011). [Mingle with astronauts at KSC complex [Online]. Available WWW: http://www.floridatoday.com/ [2011, November 1].]

**Boeing brings space jobs back to Brevard**

Inside a Kennedy Space Center hangar where shuttle orbiters were once prepared for flight, The Boeing Co. on Monday announced plans to assemble a privately operated spacecraft that could become the next vehicle to fly astronauts from Florida. A package of state incentives worth up to $50 million helped seal a first-of-its-kind deal that symbolized the space center's effort to transition from the retired shuttle program to a future that embraces commercial space operations and creates jobs. "If anyone had any doubt that Kennedy Space Center would remain open for business, this new agreement … should put that notion to rest," said Lori Garver, NASA's deputy administrator. Boeing expects that work to assemble, test and refurbish its CST-100 capsule for trips to the International Space Station will create 550 local jobs by 2015, though that outcome depends on winning NASA contracts and federal funding to help develop commercial spacecraft. Under an agreement more than a year in the making, KSC turned over use of the hangar called Orbiter Processing Facility-3 for at least the next 15 years to Space Florida, the state's aerospace economic development agency. Space Florida in turn will lease the facility and adjacent office space to Boeing, which will base its program office for commercial astronaut flights at KSC. Over the next year, state and company funding will renovate the 64,000-square-foot processing hangar to fit Boeing's needs, including tearing out tiers of access platforms that in recent years framed the orbiter Discovery. It's hoped commercial vehicles like the reusable CST-100, which can fly up to seven people, will reduce the cost of trips to the space station, attract new customers and let NASA focus more resources on exploration. The CST-100 is one of four commercial spacecraft whose development NASA helped support with $270 million this year, with Blue Origin, Sierra Nevada Corp. and SpaceX also awarded funding. Under a best-case scenario, Boeing expects the number of local jobs tied to work on the CST-100 to rise from the current 30 to 140 by 2013. Once the final design is set for the CST-100, employment would ramp up to 550 by late 2015, when the company aims to complete test flights and be ready for NASA missions with two operational capsules. About 70 percent of the positions are classified as engineering jobs. Web posted. (2011). [Boeing brings space jobs back to Brevard [Online]. Available WWW: http://www.floridatoday.com/ [2011, November 1].]

**White House Honors NASA With GreenGov Presidential Award**

NASA has won a GreenGov Presidential Award from the White House Council on Environmental Quality. The GreenGov awards celebrate exceptional efforts to promote sustainability in federal agency operations. NASA is being recognized in the "Lean, Clean and Green" category for consistently moving toward sustainable and efficient operations by setting exemplary goals in agency-wide energy and water efficiency, reduced emissions, and greater renewable energy usage. Several of NASA's sustainability solutions address the communities where agency facilities are located. GreenGov awards honor federal civilian and military personnel, agency teams, agency projects and facilities, and agency programs that exemplify President Obama's charge to lead by example towards a clean energy economy. "NASA

consistently has been a leader in federal sustainability efforts -- from the work NASA has undertaken in its facilities to its commitment to involve colleagues throughout the organization," said Michelle Moore, the president's federal environmental executive. "The GreenGov Presidential Award recognizes their exemplary performance." NASA's sustainability policy is to execute the agency's mission without compromising Earth's resources so future generations can meet their needs. Sustainability also involves taking action now to provide a future where the environment and living conditions are protected and enhanced. "NASA's commitment is exemplified by the collection of centers, such as the Langley Research Center in Hampton, Va., Ames Research Center in Moffett Field, Calif., Kennedy Space Center in Florida and Johnson Space Center in Houston, which have addressed sustainability with creative, lasting and effective methods," according to the White House council. Kennedy was nominated for its "Propellants North" project, commissioned to replace existing, uninhabitable structures dating to the 1960s. Kennedy also was nominated for its Data Center Consolidation project to unite technology assets across the center's campus. A third KSC nomination, "Building a Sustainable Future," implemented "systematic and deliberate change to weave sustainability throughout the center's entire operations," the award statement said. ["White House Honors NASA With GreenGov Presidential Award," **NASA News Release #11-371**, November 1, 2011.]

**State will run tiny-satellite competition**

Space Florida will manage a $2 million competition intended to advance technologies and markets for tiny satellites, NASA announced Tuesday. To win the prize, participants in the Nano-Satellite Launch Challenge must launch a satellite weighing at least 2.2 pounds into Earth orbit twice within a week. A first launch attempt is expected next summer. A new nonprofit called the Space Florida Small Satellite Research Center will be set up to manage the competition, one of 22 Centennial Challenges funded by NASA since 2005. Space Florida's board of directors is expected to approve the agency's creation of the nonprofit and management of the competition at a 2:30 p.m. meeting today in Fort Lauderdale. The nano-satellite challenge hopes to stimulate innovations in low-cost launch technology, according to a NASA press release. Web posted. (2011). [State will run tiny-satellite competition [Online]. Available WWW: http://www.floridatoday.com/ [2011, November 1].]

**Senate offers NASA more than House**

The Senate voted Tuesday to give NASA $17.9 billion in fiscal 2012, significantly more than the agency would get from the House. Both chambers are far apart on two key initiatives. One is the James Webb Telescope, the successor to the Hubble Telescope. The other is a commercial crew program in which NASA and private rocket companies are working together to develop a replacement for the space shuttle. The Senate bill includes $500 million for the program, compared to $312 million in the House measure. The James Webb telescope, which would get $530 million from the Senate, would get nothing under the House bill. NASA officials say both programs would be delayed if the House prevails. The House bill would provide $16.8 billion for NASA in fiscal 2012, which began Oct. 1. The Obama administration had requested $850 million for the program, which would launch the rockets from Kennedy Space Center. Web posted. (2011). [Senate offers NASA more than House [Online]. Available WWW: http://www.floridatoday.com/ [2011, November 1].]

**November 2: Excalibur Almaz, NASA sign commercial spaceflight deal**

NASA's roster of partners developing commercial vehicles to possibly fly astronauts has expanded to include Houston-based Excalibur Almaz Inc., which plans to fly upgraded versions of capsules originally designed to serve Soviet military space stations. Excalibur and NASA signed a Space Act Agreement that includes no NASA funding but allows collaboration between engineering teams. A NASA statement says the company's system for flying crews to the International Space Station would use its planned reusable, three-person space tourist vehicle with an intermediate stage, flown on a commercially available launch vehicle to be determined. Excalibur Almaz is the seventh company to partner with NASA in the second round of the Commercial Crew Development program, or CCDev-2. Web posted. (2011). [Excalibur

Almaz, NASA sign commercial spaceflight deal [Online]. Available WWW: http://www.floridatoday.com/ [2011, November 2].]

**KSC opens Vehicle Assembly Building for tours**

Tennessean Margaret Mason is no shuttle rookie. She saw her first space shuttle launch here in 2006, and then watched six of the last seven majestic liftoffs of the nation's recently retired flying machines. But Tuesday marked the first time the 64-year-old educator had an opportunity to amble into the long-restricted Vehicle Assembly Building, the landmark where NASA first put together the Saturn V moon rockets and later space shuttles. It was the first time since 1978 that the 525-foot-tall cathedral opened to the general public, and the first time tourists could see a shuttle orbiter — Endeavour — here at NASA's prime launch operations center. So Mason made a 700-mile trip from Nashville to be part of it. "I wanted to be here for the opportunity — the first public opportunity — to see an orbiter up close," she said. Access to the building for years has been rigorously restricted. Tour buses have driven right past. After all, highly flammable shuttle solid rocket booster segments were stacked inside the facility. Hazardous operations were the norm. But on Tuesday afternoon, Mason was among 51 people who poured out of a tour bus and into the facility, one of the largest buildings by volume in the world. They entered through a door on the north end, and a door to the south was open as well. Consequently, they walked into wind-tunnel conditions that would have lifted Mary Poppins aloft. They all stood in a 700-foot-long corridor that separated towering High Bays 1 and 3 on the east side of the building, and High Bays 2 and 4 on the west side. A guide recited the history of the building, and then the group was led toward the floor of High Bay 4, where Endeavour is being prepped for display at the California Science Center in Los Angeles. Web posted. (2011). [KSC opens Vehicle Assembly Building for tours [Online]. Available WWW: http://www.floridatoday.com/ [2011, November 2].]

**November 3: Efforts evolving to reshape the Cape**

On a color-coded chart of Kennedy Space Center facilities, blue represents the center's new way of doing business and the Space Coast's hopes for a thriving space industry. That's the color designating former space shuttle and other government-only facilities that are now being opened to commercial users, like the hangar The Boeing Co. this week announced it would use to build a privately operated human spaceflight capsule. "KSC is being compelled to reinvent itself," said Joyce Riquelme, manager of the center's planning and development office. "Unlike the Apollo transition, this time we have a vision and a plan." The plan to reshape the Cape as a hub for commercial space activity was the subject of a panel discussion Thursday at the SunComm 2011 conference, hosted by the Armed Forces Communications and Electronics Association at the Cocoa Beach Oceanfront Hilton. Government and industry officials promised greater diversity in local space operations and missions in the coming years, but no guarantees that the more than 8,000 contractor jobs lost with the 30-year shuttle program would easily be replaced. Boeing's work on the CST-100 spacecraft is part of a NASA program supporting development of commercial systems for flying astronauts to the International Space Station and potentially private stations. Carol Scott, with NASA's Kennedy-based Commercial Crew Program, said her office is busy working with six other companies and finalizing technical requirements for the vehicles and how their safety will be certified. "We've got to get the government out and we've got to go let industry go do this," Scott said of transportation to low Earth orbit. SpaceX, another company involved in the crew program, is preparing to launch a second demonstration flight of its Dragon spacecraft from Cape Canaveral Air Force Station before beginning a $1.6 billion contract for cargo space station shipments. ATK is another company vying to fly NASA's crews on its Liberty rocket. The company is also working with Space Florida to refurbish the state-run Launch Complex 46 to support launches of Athena and Minotaur rockets for smaller payloads. At Launch Complex 36, Space Florida is working with the much smaller Masten Space Systems to perform a series of low-altitude test flights of its Xaero suborbital vehicle, which takes off vertically and returns to the pad for landing. "We would like very much to be able to have ongoing operations here out of Florida at some point in the near future," said Sean Mahoney, chief operating officer of the 12-person company based in Mojave, Calif. Space Florida says it is in negotiations with

companies that could produce more than 4,800 jobs over the next several years. Web posted. (2011). [Efforts evolving to reshape the Cape [Online]. Available WWW: http://www.floridatoday.com/ [2011, November3].]

**November 4: Star Lab: Space Science on the Wings of Starfighters**

A New Space company based out of New Port Richey in Florida is working to provide suborbital access to space for firms with scientific payloads. The Star Lab project is an experimental suborbital launcher, designed to provide frequent, less expensive access to sub-orbit. This could allow educational and scientific institutions across the nation to conduct experiments that would normally be impractical. "If Star Lab proves itself viable, as we feel it will, this could open the door to a great many scientific institutions conducting their research by using the Star Lab vehicle," said Mark Homnick the CEO of 4Frontiers Corporation. On Oct. 27th, the Star Lab launcher was tested out while attached to the F-104 carrier aircraft via a series of fast-taxis up and down NASA's Shuttle Landing Facility located in Florida. 4Frontiers is working to launch their Star Lab sounding rocket vehicle into sub-orbital space via an F-104 Starfighter that is part of the Starfighters demo team based out of Kennedy Space Center. 4Frontiers hopes to launch a prototype early next year with commercial flights to follow about six months later. On Thursday Oct. 27, Star Lab began the first of its tests as it was mounted to a F-104 Starfighter and the aircraft then conducted several fast-taxi runs up and down NASA's Shuttle Landing Facility (SLF) with the Star Lab vehicle affixed to one of its pylons. On the last of these fast taxis, the jet aircraft deployed its drag chute. These maneuvers were conducted to collect data to test the Star Lab vehicle's response. In terms of providing access to space, compared to more conventional means, the Star Lab project is considered to be an innovative and cost-effective means for scientific firms to test their experiments in the micro-gravity environment. The Star Lab suborbital vehicle is an air-launched sounding rocket, which is designed to be reusable and can reach a maximum altitude of about 120km. The project was created through a cooperative agreement between the 4Frontiers Corporation, Starfighters Aerospace, Embry-Riddle Aeronautical University and the University of Central Florida with funding provided by the NASA Florida Space Grant Consortium. Web posted. (2011). [Star Lab: Space Science on the Wings of Starfighters [Online]. Available WWW: http://www.universetoday.com/ [2011, November 4].]

**November 7: NASA Administrator Names Peck Agency's Chief Technologist**

NASA Administrator Charles Bolden has named Cornell University Professor Mason Peck to be the agency's chief technologist, effective in January. Peck will serve as the agency's principal advisor and advocate on matters concerning technology policy and programs. Web posted. (2011). [NASA Administrator Names Peck Agency's Chief Technologist [Online]. Available WWW: http://www.spaceref.com/ [2011, November 7].]

**KSC encourage employees to apply for the latest astronaut class**

Kennedy Space Center (KSC) employees have been encouraged to apply for NASA's latest astronaut class, as the transition from purchased seats on Russian Soyuz vehicles to the International Space Station (ISS), to the fleet of commercial vehicle options in the middle of the decade, and eventually with Orion and the Space Launch System (SLS), picks up. As one of the most popular career choices as a young child, wanting to be an astronaut still holds the same lofty excitement as it always has, despite the retirement of the Space Shuttle fleet from NASA missions. While there has been a level of negative impact to the public's perception that NASA has given up on the Human Space Flight game, NASA is working on the awareness of the future roadmap for domestic human launches – set to begin no earlier than 2015 - even within their own centers. "Even as we prepare KSC to support human exploration beyond our home planet, NASA is still in the human space flight business, with a permanent crew on the International Space Station (ISS) until at least 2020," noted a memo sent to the KSC workforce. Although the bulk of astronaut training takes place at the Johnson Space Center (JSC), the encouraging of KSC employees to apply is no surprise, especially with KSC Center Director Bob Cabana being a former astronaut himself. A list of requirements were also listed in the memo, showing what remains strict rules

on being able to apply to the astronaut class – barriers which will soon be broken down via the onset of commercial space flight, especially in the area of suborbital space tourism. However, if you want the honor of flying as a NASA astronaut, which will also come with the history and esteem that was enjoyed by US citizens over the past 50 years, education, experience and good health are the three key drivers. Applications for the latest class will be accepted from this month for an unspecified period of time. Web posted. (2011). [KSC encourage employees to apply for the latest astronaut class [Online]. Available WWW: http://www.nasaspaceflight.com/ [2011, November 7].]

**November 8: Coveted Space Awards Go To Banke, Hurst**

A veteran aerospace journalist and the director of external relations at Kennedy Space Center today won prestigious news and communications awards named for the former managing editor of Aviation Week and Space Technology magazine. During a National Space Club Florida Committee luncheon in Cape Canaveral, the 2011 Harry Kolcum News and Communications Awards went to Jim Banke and Cheryl Hurst. Banke and Hurst joined the likes of the late, longtime Associated Press Aerospace Writer Howard Benedict and Jack King, NASA's Voice of Apollo, in winning the awards. The awards are presented annually to the news and public affairs professionals who excel in communicating the story of space exploration within the state of Florida and throughout the world. Banke, a former Florida Today reporter, is an award-winning journalist, writer, producer, consultant, analyst and project manager who has covered the nation's space program for more than a quarter century. In 2006, he served on the Governor's Commission on the Future of Aeronautics and Space in Florida. The group's recommendations led to the creation of Space Florida, a state economic development organization. Banke was honored by NASA with a Distinguished Public Service Medal the following year. Hurst is director of education and external relations at KSC. In this position she provides guidance and direction to KSC's strategic communications team, government relations representatives, public outreach programs, guest operations, protocol and education programs. She communicates NASA's messages to internal and external audiences, including senior management, business and community leaders, legislators, dignitaries, academic institutions, KSC guests and the general public. Hurst also manages the KSC Visitor Complex concession agreement and has oversight of the KSC History Program and Speaker's Bureau. Hurst specializes in promoting public awareness of the importance and excitement of the nation's space program and has played key roles in connecting NASA with national media. She fostered partnerships with ABC-TV's Extreme Makeover, Discovery's Cake Boss, Carnival Cruise Lines, Bill Nye The Science Guy and the Tom Joyner Morning Show. In the months leading up to the retirement of NASA's shuttle fleet, she oversaw efforts to allow workers to bring their families to see key milestone such as shuttle rollouts to the launch pad. She was instrumental in championing a celebration of the 30-year shuttle program with new and unique opportunities for workers and the public. More recently, Hurst has spearheaded an expansion of events surrounding expendable rocket launches, increasing opportunities for NASA guests and visitors at the launches of NASA space science and planetary exploration missions. Web posted. (2011). [Coveted Space Awards Go To Banke, Hurst [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, November 8].]

**NASA Aims for 2014 Orion Test Flight at Cape**

NASA aims to launch an early test flight of its Orion crew exploration vehicle from Cape Canaveral in 2014 to test its heat shield and other atmospheric reentry systems, officials said today. The most likely launch vehicle: A United Launch Alliance Delta IV Heavy that would fly out of Launch Complex 37 at Cape Canaveral Air Force Station. Officials at NASA Headquarters said the agency is proposing to add the unmanned flight test to the Orion development contract it has with American aerospace giant Lockheed Martin. The flight test would support the development of the Space Launch System, a heavy-lift rocket NASA aims to develop to send astronauts on missions beyond Earth orbit. Exploration Flight Test, or EFT-1, would fly two orbits to a high-apogee, with a high-energy re-entry through Earth's atmosphere. Orion will make a water landing in the Pacfic Ocean. The spacecraft would be recovered by Kennedy Space Center workers using operations planned for future human exploration missions. Web

posted. (2011). [NASA Aims for 2014 Orion Test Flight at Cape [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, November 8].]

**November 9: NASA buyouts may trim KSC's work force further**

Roughly 150 Kennedy Space Center employees are eligible for voluntary buyouts NASA is offering to trim its civil service work force. The reductions, if fulfilled, would be the first notable drop in the center's government ranks since the shuttle program's end this summer, which saw thousands of contractors let go, though agency officials say the two issues aren't directly related. "We're just trying to maintain the level of work force necessary to perform long-range work," said Grey Hautaluoma, a spokesman at NASA headquarters in Washington, D.C. NASA on Tuesday could not immediately provide the total number of buyouts being offered across the agency, which has nearly 19,000 civil servants, or how many centers were involved. The deal offers up to $25,000 to eligible employees who would leave the agency in January. The eligibility criterion varies by center, Hautaluoma said. At headquarters, 147 positions were identified as eligible but only 50 buyouts will be accepted. A similar number of eligible positions were "targeted" at KSC, but the total departing isn't yet confirmed. About 100 buyouts are expected out of 400 eligible employees at Johnson Space Center in Houston, a spokeswoman said. KSC had 2,178 civil servants as of Oct. 1, a number that has held steady for years. The center's contractor workforce, on the other hand, dropped precipitously with the shuttle program's end, from 13,000 in early 2009 to a current total of about 6,700. KSC Director Bob Cabana expects the combined contractor and civil servant work force to climb back to 10,000 in the coming years as work on new commercial space taxis and exploration vehicles ramps up. The agency last offered buyouts in 2005, Hautaluoma said. "Nobody's required to take it," he said of the current offers. "We're always trying to make sure we have the right work for the task at hand, so we offered this incentive to people, but it's totally voluntary." Web posted. (2011). [NASA buyouts may trim KSC's work force further [Online]. Available WWW: http://www.floridatoday.com/ [2011, November 9].]

**Congress moves to fund space shuttle contractors' pensions**

Congress is getting nearer to closing a roughly $500 million gap in a pension fund for thousands of former space shuttle contractors. The Senate last week approved a $17.9 billion budget for NASA in fiscal 2012 that includes the pension money. Senators still must negotiate a final spending plan with the House, where lawmakers have proposed giving NASA $16.8 billion. But because the House proposal also includes the pension contribution, it's expected to survive in a final House-Senate compromise. The funding could constitute as much as 3 percent of NASA's fiscal 2012 budget, a significant amount for an agency already facing delays in important projects due to because of congressional belt-tightening. But the government agreed early on to cover any pension shortfall for shuttle contractors, and advocates for the private-sector workers say the nation owes them the retirement benefits they're due. NASA has routinely included pension funding as part of its contracting for the shuttle program, which ended in July when Atlantis flew the final flight. Dozens of space shuttle program contracts were consolidated in 1996, when Boeing and Lockheed Martin created United Space Alliance to allow NASA to deal with a single contractor. Roughly 11,000 people are eligible for the pension program. The value of the money set aside and invested to pay the pensions is now worth about half of what workers are owed, thanks largely to steep declines in the stock market. When United Space Alliance decided to close its pension plan as a result of the shuttle's retirement, the government had to step in and come up with the money to close the gap, agency spokesman Mike Curie said. "There's no concern at all that the employees will not get their benefits," Curie said. "By law, the government has to do this." Web posted. (2011). [Congress moves to fund space shuttle contractors' pensions [Online]. Available WWW: http://www.floridatoday.com/ [2011, November 9].]

**November 10: NASA preps rover flight to Mars**

NASA scientists said Thursday the launch of its Mars Science Laboratory spacecraft in about two weeks could yield a potential "home run" in space exploration. The new rover Curiosity, bigger and better than

its predecessors, is at the forefront of NASA's effort to investigate Mars for the possibility of habitable life. The $2.5 billion Mars Science Laboratory spacecraft is scheduled for liftoff at 10:25 a.m., November 25 from Florida's Cape Canaveral Air Force Station. Once the sedan-sized Curiosity launches, it will travel about nine months to the surface of the Mars, landing around August 2012. If weather does not permit liftoff on the scheduled day, NASA has made preparations to launch up until December 18, the agency said. Web posted. (2011). [NASA preps rover flight to Mars [Online]. Available WWW: http://www.cnn.com/ [2011, November 10].]

**New appointments at ISS National Lab nonprofit**

The Kennedy Space Center-based nonprofit tasked with overseeing non-NASA research on the International Space Station today announced several new appointments. Joining the Center for the Advancement of Science in Space, or CASIS, according to a press release, are: -- Duane Ratliff, director of operations. Ratliff most recently served as Senior Vice President at Dynamac Corporation. -- Brian Harris, director of marketplace development. Harris is a certified program manager and most recently served as Director of Business and Program Development at Aerojet. -- Charles Resnick, director of economic valuation. Resnick is a business executive with more than 25 years of experience in global and financial management, private equity/venture capital, start-ups, and operations and strategic positioning focusing on technology, banking and consumer products. "CASIS is growing quickly and we are thrilled to have these high caliber professionals join our team," CASIS Director Jeanne Becker said in a statement. "CASIS has a major responsibility to American citizens, the research and education community, and to NASA to maximize utilization of ISS National Lab for enhancing life on Earth. These new executives will help us fulfill that mission." The center also announced two new managers: -- Melissa Schwaller, Ph.D., J.D., will serve as Intellectual Property and Compliance Manager. -- Diane Matthews will serve as STEM Manager for CASIS, promoting education initiatives in Science, Technology, Engineering and Math. Web posted. (2011). [New appointments at ISS National Lab nonprofit [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, November 10].]

**Pegasus sails from KSC into uncertain future**

The barge NASA used to deliver space shuttle external fuel tanks from New Orleans to Florida set sail from Kennedy Space Center this morning, possibly for the last time. The Pegasus, towed by a crew of three seamen and one technician aboard the Freedom Star solid booster recovery ship, is bound for Bay St. Louis, Miss., where it will remain in storage until a new use is determined, NASA said in a press release. The 266-foot-long, 50-foot-wide covered barge is expected to complete the It's 900-mile journey Nov. 16. The Pegasus sailed 41 times and delivered 31 space shuttle external tanks between 1999 and 2011. This time it is carrying ground support equipment that was used to install space shuttle main engines in orbiters. The Kennedy shop where the engines were stored and processed between flights is among the facilities turned over to Space Florida for future use by The Boeing Co., which on Oct. 31 announced plans to manufacture its CST-100 commercial crew capsule at KSC. The engines will be utilized in testing and early flights of the giant rocket NASA is developing for deep space exploration, the Space Launch System. The Marshall Space Flight Center's Shuttle-Ares Transition Office in Huntsville, Ala. is responsible for determining the fate of the Pegasus and ground support equipment. Web posted. (2011). [Pegasus sails from KSC into uncertain future [Online]. Available WWW: http://www.floridatoday.com/ [2011, November 10].]

**November 11: SpaceX scouting sites for launch**

Anticipating a sharp increase in its launch rate in the coming years, SpaceX is hunting for a new launch pad and considering several sites outside the Space Coast. CEO Elon Musk wants a pad exclusively to serve commercial customers, one that might be based in Texas, Virginia, Puerto Rico or as far away as Hawaii. Flights of government missions such as NASA cargo, astronauts and defense payloads, if SpaceX wins the business, would continue from Air Force stations here and in California. With an all-commercial

launch site, SpaceX is seeking more freedom to launch when and how it wants, with fewer of the restrictions on launch opportunities and access that apply on secure military facilities. The increased flexibility could enable more rapid launches, attract customers and reduce costs. On the flip side, many of the new sites under consideration would require expensive infrastructure and each carries geographic challenges, from launch trajectories that fly over populated areas to inconvenient distances from other company operations. Florida is working to keep as many launches as possible in the state, which recently invested $7 million to help SpaceX expand its Cape Canaveral Air Force Station facilities to enable more frequent flights. SpaceX hopes to launch Falcon 9 rockets from Launch Complex 40 as often as once a month by 2015. Use of an additional Cape pad, a former shuttle pad at Kennedy Space Center or even a South Florida site could be offered to help sustain that rate. The Cape options, however, can't eliminate the potential problem of schedule conflicts with other rocket launchers and higher-priority national security payloads. Wherever it ends up, state officials don't think Musk's commercial-only pad concept is likely to significantly dilute the company's local operations. Web posted. (2011). [SpaceX scouting sites for launch [Online]. Available WWW: http://www.floridatoday.com/ [2011, November 11].]

**November 12: Happy 30th birthday, Canadarm**

The iconic Canadarm, which first flexed its mechanical muscles on a space shuttle 30 years ago, has grown up — and it's gotten smaller along the way. It was on Nov. 13, 1981, that the first robotic space limb was deployed on U.S. Space Shuttle Columbia. The anniversary, and the recent end of the shuttle program, provide an occasion to remember the past of the Canadian robotics sector and consider where it goes from here. Over 30 years, the Canadarm has helped build the International Space Station, repaired satellites in space and even fixed broken toilets. The huge robotic arm with its Canada wordmark retired last July after making the last of its 90 shuttle missions and voyages totalling over 624 million kilometres. Two other robotic arms — Canadarm2 and DEXTRE, a two-armed, $200-million robot — are still on the job on the space station. MacDonald, Dettwiler and Associates (MDA), built five Canadarms. The original Canadarm will soon be brought back to Canada, sometime after the end of the year. The robotic arm was last used on the Shuttle Endeavour during its final space mission, which ended June 1. Web posted. (2011). [Happy 30th birthday, Canadarm; milestone comes at pivotal moment for Canadian robotics [Online]. Available WWW: http://thetyee.ca/CanadianPress/ [2011, November 12].]

**NASA Hitches a Ride on a Russian Craft**

A Russian Soyuz rocket with three astronauts — two Russians, one American — is set to lift off from Kazakhstan on Monday morning, ferrying the men to the International Space Station. Ordinarily, the launching of a Soyuz, Russia's workhorse rocket for decades, is a mundane event. But this time the future of the space station — and, indeed, the space programs of Russia and the United States — may be riding on the mission's success. There are now three crew members living on the space station, and they are scheduled to return to Earth this month; if the three relief astronauts do not arrive before then, the space station will be empty for the first time in more than a decade. The flight is also the beginning of a new chapter for NASA, which ended its space shuttle program in July and is now turning to foreign governments and commercial enterprises for space transportation. Monday's launching will be the first trip by astronauts to orbit since the retirement of the shuttles. Daniel C. Burbank, Anton N. Shkaplerov and Anatoly A. Ivanishin are scheduled to launch at 10:14 a.m. Monday — which is 11:14 p.m. Sunday Eastern time — from the Baikonur Cosmodrome in Kazakhstan. The trip, which was supposed to take place in September, was postponed after the failure in August of a Russian unmanned cargo rocket. NASA officials expressed confidence that their Russian counterparts had diagnosed and corrected the problem. Web posted. (2011). [NASA Hitches a Ride on a Russian Craft, and Begins a New Dependent Phase [Online]. Available WWW: http://www.nytimes.com/ [2011, November 12].]

**November 13: SpaceX, NASA schedule next Dragon flight for early 2012**

The first SpaceX demonstration flight to the International Space Station will launch no sooner than January as NASA awaits final delivery of flight software before clearing the mission to proceed,

according to space agency sources. A NASA manifest document shows the launch set for Jan. 12. SpaceX has a date on the Air Force-run Eastern Range for liftoff Jan. 7, at the earliest. But an agency official familiar with the mission described the date as challenging and said February is a more likely timeframe for the flight. SpaceX and NASA previously stated Dec. 19 was the earliest the mission could blast off from Cape Canaveral, Fla. Web posted. (2011). [SpaceX, NASA schedule next Dragon flight for early 2012 [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, November 13].]

**November 14: Senate Committee Announces Witnesses for Thursday's NASA Hearing**

The Senate Commerce, Science and Transportation Committee has announced the witnesses for its hearing on Thursday concerning NASA's human space exploration program. All are from NASA. The hearing, "NASA's Human Space Exploration: Direction, Strategy, and Progress," is being convened by the Science and Space subcommittee chaired by Senator Bill Nelson (D-FL). According to the committee's website: "At this hearing, the Subcommittee will consider NASA's plans for human exploration, including the programs, projects, and activities for developing the Space Launch System, crew vehicle, and ground support. This hearing will provide an opportunity to articulate NASA's goals for human exploration and how they complement International Space Station support and utilization, technology development, international collaboration, and commercial activities." Panel 1 consists only of NASA Administrator Charles Bolden. Panel 2 consists of three NASA center directors: Robert Cabana, Kennedy Space Center; Michael Coats, Johnson Space Center; and Robert Lightfoot, Marshall Space Flight Center. Web posted. (2011). [Senate Committee Announces Witnesses for Thursday's NASA Hearing [Online]. Available WWW: http://www.spacepolicyonline.com/ [2011, November 14].]

**November 15: NASA budget cuts could delay new jobs at KSC**

A reduced NASA budget set to pass Congress this week could slow White House plans to use commercial rocket companies as a lifeline to the International Space Station -- and delay hundreds of jobs slated for Kennedy Space Center. The proposed $17.8-billion budget is roughly $650 million less than what NASA received this year and includes about $400 million to fund commercial rocket companies -- less than half the amount requested by President Barack Obama. While that's more than the $312 million the program received in 2011, industry advocates have argued that more money is needed to speed development of human-rated spacecraft. Chief among them is Boeing, which one top official said earlier this year could launch astronauts to the station by 2015 if NASA funded commercial efforts at $850 million annually over the next five years – as sought by the White House. John Elbon, manager of Boeing's commercial crew program, has warned that less funding could mean delays of a year or more for its planned crew capsule, potentially impacting the company's aims to hire 550 workers on the Space Coast. NASA is developing its own rocket and capsule, called the Space Launch System, intended for missions to nearby asteroids or the moon. That program, which isn't expected to have a crewed flight before 2021, will get the lion's share of $3.8 billion budgeted next year for the agency's exploration division. Another program that stands to gain under is the troubled James Webb Space Telescope. U.S. House appropriators proposed canceling the Webb this summer, after its price rose to an estimated $8.7 billion -- a $5.2-billion increase -- and its launch date slipped by seven years to 2018. Web posted. (2011). [NASA budget cuts could delay new jobs at KSC [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, November 15].]

**NASA grows audience, credibility through tweetups**

Rocket science isn't easily explainable in 140 characters, but NASA is asking a group of people to do just that with a series of VIP tours for some of its ardent Twitter followers. The events called tweetups offer ordinary science fans a behind-the-scenes look at the space agency's facilities that can include its astronauts and scientists. In exchange, many participants _ whose day jobs range from church office worker to baker _ narrate their day through tweets, photographs and videos. NASA's imagination-grabbing work gives it a bigger pool of fans to draw from than many companies or government agencies, and it sets itself apart further with its egalitarian approach to social media. While it's not unusual for an

organization to give special access to journalists or influential bloggers, experts say NASA sets itself apart by inviting people who may only have a few dozen followers. Participants are chosen through a lottery. While some end up being self-described techies who blog regularly about space, it's important to NASA that it draws people with a wide range of interests who can tweet with authentic voices to a varied audience. NASA's first tweetup was in 2009, and it's held a total of 30. Some have coincided with news events like rocket launches, and one is planned in Florida the week of Thanksgiving for the Mars rover launch. The events can last from two hours to two days, ranging from a few dozen participants to more than 100. Participants pay their own travel expenses. While it's not clear how many new Twitter followers NASA has gained from the tweetups, the number is expanding rapidly. Since June, nearly 600,000 people have started following the agency _ about 4,000 to 5,000 per day _ for a total of about 1.6 million. NASA tweetup alumni closely monitor their reach and noted that when 150 participants were invited to Kennedy Space Center in Florida this August for the Juno spacecraft launch their tweets _ through the power of retweets _ had 29.9 million potential views. Web posted. (2011). [NASA grows audience, credibility through tweetups [Online]. Available WWW: http://azdailysun.com/ [2011, November 15].]

**November 16: Mobile launcher on the move at KSC**

The mobile launch tower that will support NASA's next exploration rocket is on its way to launch pad 39B at Kennedy Space Center. The crawler-transporter hauling the 6.8-million pound launcher -- towering some 400 feet off the ground -- began rolling from a park site next to the Vehicle Assembly Building at 9:15 a.m. The 4.2-mile trip to the pad will give engineers data on how much the tower sways and wiggles during the journey. Then two weeks of tests at the pad will provide a comprehensive "fit check." It's only the second time the mobile launcher has been moved. The first time it only moved a few hundred feet, from its construction site west of the assembly building to a parking area on the eastern side. The Apollo-style mobile launcher was built for the cancelled Constellation program's Ares I rocket. The base and tower structures have cost $238 million to date. NASA expects to spend roughly $100 million to rebuild the base to support the much heavier Space Launch System, the new heavy-lift rocket planned for human exploration of deep space. Then the structure will have to be outfitted with the various systems needed to support the rocket and an Orion capsule, at a so far unconfirmed cost. The mobile launcher is supposed to be completed in time to support an uncrewed 2017 test launch of the new vehicle from pad 39B. Web posted. (2011). [Mobile launcher on the move at KSC [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, November 16].]

**November 17: KSC to get as much as $484 million in construction money**

A dark year for Kennedy Space Center got a bit brighter Thursday when a key Florida lawmaker announced that the aging NASA facility would get as much as $484 million over the next year to upgrade its launch infrastructure. That's more than expected and would put KSC back on track to meet President Barack Obama's goal of spending $1.9 billion over five years to transform the half-century-old center into what his administration has dubbed a "21st century launch complex. "This is real. These are real dollars," said U.S. Sen. Bill Nelson, D-Florida, who successfully pressed to secure the money. However, $316 million is subject to NASA's discretion on where to spend it. A bill that includes NASA funding — and money for KSC — passed the U.S. House Thursday afternoon and cleared the Senate hours later. The money for KSC is intended to help the center transition from its 30-year-old mission of launching space shuttles, an assignment that ended with the final flight of Atlantis in July. NASA is pressing ahead on two fronts: hiring commercial rocket companies to re-supply the International Space Station — some would launch from KSC — and investing in a new heavy-lift launch vehicle that could send astronauts to the moon or a nearby asteroid sometime in the 2020s or later. KSC Director Bob Cabana, on Capitol Hill for a Thursday hearing on NASA's future, said the $484 million would help both endeavors by upgrading center facilities so they could handle new types of rockets. "Primarily, it's going into Launch Complex 39 to prepare for the heavy-lift vehicle and do those things we need to do support commercial operations there," he said. He also said there was "a lot of work to be done" in aging the Vehicle Assembly Building

to ready it for the new rocket and its companion capsule. Cabana wouldn't comment on how many jobs the money would generate, other than to note that many would be construction-, rather than space-related, in the early going. KSC employment is expected to drop to 8,200 workers next year, and center officials have aimed to bring that number back to 10,000 in the next five years as NASA gets closer to launching its new rocket and capsule. The agency is planning two unmanned flights — one in 2014, the other in 2017 — to test the new system, with a first manned mission scheduled for 2021. While $484 million is the top-end in funding for KSC, not all the money is guaranteed. Nelson said $168 million would come from a NASA fund devoted exclusively to upgrading KSC and that as much as $316 million could be steered to the launch complex to prepare it to handle NASA's new rocket and capsule. Details were not immediately available on how much of that money would go to KSC next year. Web posted. (2011). [KSC to get as much as $484 million in construction money [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, November 17].]

**NASA Ponders Orion Abort Test**

Engineers on NASA's multi-purpose crew vehicle (MPCV) would like to conduct an ascent-abort test before sending their capsule around the Moon on the first flight of the heavy-lift Space Launch System in 2017, but first they must find another $163 million to fund the recently announced flight test of its planetary re-entry system in 2014. Michael Coats, director of Johnson Space Center in Houston, where the Orion-based deep-space crew vehicle is managed, told the Senate Commerce science and space subcommittee Nov. 17 that the program still hasn't identified the entire $372 million cost of the 2014 flight test. That test, announced earlier this month, will subject the vehicle's advanced heat shield to temperatures and loads approaching those it will experience on a direct return from the Moon or beyond. Tentative plans call for the test to re-enter at 84% of lunar re-entry speed. Coats confirmed that the capsule, which Lockheed Martin started developing under the old Constellation program and will continue under the new MPCV approach, will be launched on a Delta IV rocket. Lockheed Martin plans to refurbish the first ground test article for the flight test, and had been considering the Delta IV as the launch vehicle. Robert Cabana, director of Kennedy Space Center, said the 2014 test flight will give recovery crews based at his Florida launch center a chance to check out procedures they are developing to recover the capsule at sea. NASA's going-in plan for the 2017 flight would use an early version of the SLS to send an unmanned capsule on a lunar flyaround to conduct additional testing of the thermal protection system. A second flight with a crew is scheduled in 2021. Administrator Charles Bolden told the panel that funding for the SLS/Orion development to support those dates will be reflected in the fiscal 2013 budget request NASA submits in February. Web posted. (2011). [NASA Ponders Orion Abort Test [Online]. Available WWW: http://www.aviationweek.com/ [2011, November 18].]

**November 18: NASA Announces Space Shuttle Closeout Contract Modification**

NASA announced the Space Shuttle Program and subcontractor closeout modification to the Space Program Operations Contract (SPOC) with United Space Alliance (USA) of Houston, valued at $232.9 million. The contract covers SPOC closeout actions from Oct. 1, 2011 through Sept. 30, 2013, including: -- Making orbiters Discovery, Atlantis and Endeavour safe for public display; -- Ferry operation activities for Discovery; -- Property, information technology systems and records disposition by USA; -- Subcontract closeout activities including property disposition, information technology systems disposition and records disposition by 31 subcontractors through firm-fixed-price contracts and five subcontractors through five cost-plus type contracts. The principal locations of the various work elements are USA's facilities in Houston, Huntsville, Ala.; and Titusville, Cocoa Beach and Kennedy Space Center in Fla. This is a cost-plus-award-fee-reimbursement contract. ["NASA Announces Space Shuttle Closeout Contract Modification," **NASA Contract Release #C11-046**, November 18, 2011.]

**SpaceX has short list for commercial launch site**

SpaceX is eyeing Puerto Rico, Texas, Hawaii, or Florida to be home of a new commercial launch facility for its Falcon rocket family, the company's founder and chief executive tells Spaceflight Now. The site

would handle commercial missions, while flights for federal government customers could continue to be based from Cape Canaveral, Fla., or Vandenberg Air Force Base, Calif. SpaceX has launched two medium-lift Falcon 9 rockets from launch pad 40 at Cape Canaveral, and it's developing a facility at Vandenberg to handle polar orbit satellite missions, including early test flights of its Falcon Heavy, which would be the world's most powerful launcher. According to Elon Musk, the founder and CEO of SpaceX, the search is focusing on U.S. territory due to trade restrictions that could be imposed by International Traffic in Arms Regulations, which were intended to inhibit the transfer of U.S. weapons technology to other countries. The company says it has more than $3 billion in revenue on the books through 2017, and it has sold more than 40 missions on the Falcon 9 rocket. More than half of those flights are for commercial customers, according to SpaceX. Logistics costs will be a factor in the decision. Web posted. (2011). [SpaceX has short list for commercial launch site [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, November 18].]

**November 19: NASA Mars Science Laboratory Launch Delayed**

According to NASA PAO: "The launch of a United Launch Alliance Atlas V carrying NASA's Mars Science Laboratory (MSL) has been delayed one day to allow time for the team to remove and replace a flight termination system battery. The launch is rescheduled for Saturday, Nov. 26 from Space Launch Complex-41 at Cape Canaveral Air Force Station, Florida. The one hour and 43 minute launch window opens at 10:02 a.m. EST." Web posted. (2011). [NASA Mars Science Laboratory Launch Delayed [Online]. Available WWW: http://www.nasawatch.com/ [2011, November 19].]

**November 20: Happy 9th birthday to the Delta 4 rocket**

Sunday marks the 9th anniversary of the first Delta 4 rocket launch from Cape Canaveral carrying a commercial European communications satellite into orbit. Take a look back to our coverage of that maiden mission. Web posted. (2011). [Happy 9th birthday to the Delta 4 rocket [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, November 19].]

**November 21: Battery swap on tap for Curiosity**

A faulty battery on a critical public-safety system will be replaced on an Atlas V rocket today, clearing the way for a holiday weekend launch of NASA's $2.5 billion Mars Science Laboratory mission. The 19-story United Launch Alliance rocket is scheduled to blast off from Launch Complex 41 at Cape Canaveral Air Force Station at 10:02 a.m. Saturday — a day later than initially planned. The launch slipped to give engineers and technicians time to replace a faulty battery on the rocket's Flight Termination System. The system would enable range safety officers to deliberately destroy the Atlas V in flight if the rocket veered off course and threatened populated towns and cities surrounding the launch base. Engineers started activating a spare battery during the weekend. The process takes several days to complete.
"Unfortunately, it's not like going to Ace Hardware and getting a battery off the shelf," NASA Kennedy Space Center spokesman George Diller said Monday. The installation of the spare battery is expected to take place today. Tests will be performed to ensure range safety officers could send an encrypted signal to receivers on the rocket if it strays off course. The receivers would route the signal to small explosive devices that would rip apart the errant rocket. The deliberate destruction of the rocket would enable range safety officers to keep any falling debris within a launch hazard area that is cleared before flight. The need to perform the battery swap did not prevent NASA from proceeding over the weekend with other key preparations for the flight. A countdown dress rehearsal was conducted on Sunday. The training exercise enables a NASA-ULA launch team to go through a simulation of the procedures that will be carried out during the course of the real countdown. NASA has until Dec. 18 to launch the Mars Science Lab and its Curiosity rover. A slip past then would force NASA to delay the launch two years until Earth and Mars could once again come into alignment for the flight. The launch window on Saturday will extend through 11:45 a.m. NASA and ULA would have launch opportunities every five minutes during that one-hour, 43-minute chance to get the mission under way. The launch must be precisely timed to put the rocket and the spacecraft on course. A launch on any day between Friday and Dec. 18 would result in

an arrival at Mars between 1 a.m. and 1:30 a.m. EDT on Aug. 6, 2012. The arrival date and time for the Mars Science Lab are precise to make certain NASA's Mars Reconnaissance Orbiter and Mars Odyssey spacecraft — also an orbiter — are in place to monitor atmospheric entry, descent and landing. Web posted. (2011). [Battery swap on tap for Curiosity [Online]. Available WWW: http://www.floridatoday.com/ [2011, November 21].]

**November 26: Curiosity rover is off to Mars**

Mounted atop a United Launch Alliance Atlas V rocket, the high-profile payload blasted off from Cape Canaveral Air Force Station with a brilliant burst of flame and a giant whoosh of hot white exhaust. Now speeding away from Earth, NASA's Mars Science Laboratory and its Curiosity rover aim to land on the red planet next August. Science instruments onboard cannot detect life directly. But they can yield evidence of all the key building blocks of life as we know it. They can determine whether Mars is, or once was, habitable — suitable to sustaining microbial life. More than 13,000 NASA VIPs crowded launch viewing sites at nearby Kennedy Space Center. Thousands watched along the banks of the Indian River in Titusville, Jetty Park in Port Canaveral, Cocoa Beach and other prime public viewing sites. The Curiosity rover runs on a nuclear battery — a generator that converts heat from the natural decay of Plutonium-238 into electricity. The Atlas V rocket gave the Mars Science Lab a problem-free first leg of a 354 million-mile interplanetary journey. During the next eight months, flight controllers will keep the lab and its rover on course for an arrival at Mars between 1 and 1:30 a.m. EDT Aug. 6. Then comes what many believe is the most daring, most treacherous part of the mission — landing inside a gaping crater just below the equator on the eastern side of the planet. The Mars Science Lab will hit the upper reaches of the Martian atmosphere at 13,200 mph. The 2-ton Curiosity rover is about the size of a Mini Cooper. It's much too heavy to use the type of airbag landing system employed by NASA's Pathfinder, Spirit and Opportunity rovers. So engineers designed a scheme that combines parachutes, retrorockets and a sky crane to put Curiosity on the ground. The arrival will involve the first-ever guided entry through the Martian atmosphere. The spacecraft will maneuver like a shuttle on its way toward the landing site, using aerodynamic lift and S-turns to bleed off speed. Web posted. (2011). [Curiosity rover is off to Mars [Online]. Available WWW: http://www.floridatoday.com/ [2011, November 27].]

**NASA's Curiosity rover flying to Mars with autographs on board**

NASA's Mars Science Laboratory with its car-size Curiosity rover is now on its way to the Red Planet, after its launch from Cape Canaveral, Fla. on Saturday. Outfitted with the most advanced scientific gear ever sent to Mars in an effort to learn whether conditions there can support microbial life, the rover is also equipped with an autograph collection, starting with the signature of the President of the United States. Starting with a liftoff at 10:02 a.m. EST (1502 GMT) atop a United Launch Alliance (ULA) Atlas V rocket, the Mars Science Laboratory (MSL) spacecraft set off on an 8 1/2 month trip to Mars. The Curiosity rover is expected to land on the planet on Aug. 6, 2012 following a parachute- and retrorocket-assisted descent that will culminate in a sky crane carefully lowering it the final 66 feet (20 meters) to the surface. Hidden in plain sight on the rover's deck, or its top, is a plaque inscribed with the signatures of President Barack Obama and Vice President Joe Biden, in addition to other administration and NASA leaders. The etched metal plate, which continues a more than 40-year tradition of sending presidential plaques on planetary missions, is only one of the signature collections on board Curiosity. Elsewhere on the rover is the autograph of the 14-year-old girl from Kansas who gave Curiosity its name along with millions of digital signatures from members of the public who signed up through NASA. Curiosity itself will also add its own signature to the martian surface, courtesy of its specially-treaded wheels. Each 20-inch (50.8-centimeter) aluminum wheel features a tread specially designed to allow Curiosity to leave behind the autograph of its maker, the Jet Propulsion Laboratory. As Curiosity drives over the martian terrain, the groves in each wheel will form a string of 'dash' and 'dot' imprints — morse code that will spell out "J-P-L." Web posted. (2011). [NASA's Curiosity rover flying to Mars with Obama's, others' autographs on board [Online]. Available WWW: http://www.collectspace.com/ [2011, November 26].]

**Plutonium disaster plan back on shelf**

At the Brevard County Emergency Operations Center, more than 30 emergency and safety responders, along with representatives from the Department of Energy, breathed a sigh of relief 50 seconds into Saturday's launch. "We're clear of any risk at this point," said EOC Director Bob Lay, 55 seconds after the Atlas V rocket carrying the Mars rover Curiosity launched from Cape Canaveral Air Force Station. Starting at 6 a.m., representatives from multiple agencies, including Port Canaveral Police, Patrick Air Force Base, Kennedy Space Center, Brevard County Fire-Rescue, the state Department of Transportation and Florida Department of Law Enforcement, were poised to respond to any launch disaster that might have occurred. Those agencies had worked with NASA on an emergency response plan based on any potential human exposure to the plutonium on board Curiosity — even though NASA officials said the threat of exposure would have amounted to little more than the equivalent of a dental X-ray. "This was four or five years in the making," Lay told responders on hand Saturday morning. "We're happy it's done. It's over with, and the next launch, I understand, isn't planned until 2016. "It was a good, safe launch. If something had happened, we would have been somewhat busy here, but thank goodness we didn't have to put that all into play." Web posted. (2011). [Plutonium disaster plan back on shelf [Online]. Available WWW: http://www.floridatoday.com/ [2011, November 27].]

**November 27: Stolen space treasures rescued from auction**

The identification badges of three astronaut heroes who were killed in the line of duty. Heat-shielding tiles plucked from the space shuttle orbiters. A humongous rocket engine. Those are some of the items stolen by space workers who apparently tried to sell them, through a friend or via auction houses or websites like eBay. The crimes were foiled by agents working for NASA's Inspector General, the taxpayer-watchdog arm of the nation's space agency. Over the course of the last half year, they've also identified and tried to suggest fixes to problems that led to the waste of millions of dollars of taxpayer money, put astronauts or other space workers in danger or threatened the security of critical computer systems at NASA sites across the country. But it's the theft of space artifacts and hardware that jump out of the public records documenting the inspector general agents' work. Times are tough and perhaps no tougher than for space agency workers trying to find a way to transition to new lives, either as part of the downsized program or in new jobs. But it's troubling to read some of the stories outlined by the inspector general about swiped space stuff. Consider just these few: A former top security official at the Kennedy Space Center kept secret for 44 years the fact that he, somehow, had secured the identification badges of Gus Grissom, Roger Chaffee and Ed White, the three astronauts who died in a fire during a pad test at the beginning of the Apollo moon shot program. Their sacrifice at the Cape that day helped pave the way for the eventually successful Apollo moon landings, but also spurred exhaustive safety reforms throughout NASA that no doubt saved the lives of astronauts and space workers for decades to come. They definitely earned the moniker hero. The badges are valuable collectibles apparently. The IG determined, with the help of auction experts, that they could have fetched anywhere from $20,000 to $30,000 at sale. They clearly determined that the person who'd kept them hidden all these years intended to sell them "for monetary gain." In a story that got more attention when it happened, a shuttle contract worker was making far less by swiping heat-shielding tiles and auctioning them on eBay. By the time the inspector general's office agents busted the scam, about 12 tiles had sold, but none for more than about $900. Perhaps the most bizarre story, though, was this one: the mysterious appearance of an RL-10 rocket engine for sale. The inspector general's office traced the item after it appeared in an advertisement on an online auction site. The seller told investigators the engine, which is of the type utilized in the upper stage of the Saturn moon rocket, was obtained from another person who had gotten it from an unidentified NASA worker. The engine is a very valuable piece of machinery, valued at about $200,000, and one with historic prowess. It's the United States' first liquid-fueled rocket engine. Perhaps more intriguing is its size, and the questions the incident raises about how someone could have somehow spirited away a 300-pound rocket engine, presumably from a guarded NASA facility. It's also considered a major security risk. The RL-10's technology is governed by international trade laws aimed at preventing such capabilities from falling into the hands of potential enemies such as Iran. So it's against the law to sell it

or even give it away to the general public (let alone steal and fence it). All told, reaching beyond just the thefts, Inspector General Paul Martin's office is responsible for saving or recovering millions of dollars in taxpayer funds and perhaps spurring changes that could save more. Web posted. (2011). [John Kelly: Stolen space treasures rescued from auction [Online]. Available WWW: http://www.floridatoday.com/ [2011, November 27].]

**Shuttle launch director to leave NASA**

The steady hand who led NASA's shuttle launch team through International Space Station assembly, recovery from the 2003 Columbia accident and shuttle fleet retirement is leaving the space agency this week after almost three decades of service. Veteran Shuttle Launch Director Mike Leinbach will be joining "a major aerospace company," taking a job that will keep him and his wife, Charlotte, on Florida's Space Coast. They reside in Scottsmoor. He didn't disclose the name of the company. Web posted. (2011). [Shuttle launch director to leave NASA [Online]. Available WWW: http://www.floridatoday.com/ [2011, November 27].]

**November 29: KSC Visitor Complex making room for Atlantis**

Cranes this morning are removing a pair of shuttle solid rocket boosters and an external tank that have been prominently displayed for years in Shuttle Plaza at the Kennedy Space Center Visitor Complex. Moving the equipment will begin to make room for the $100-million facility the visitor center plans to build to house the retired orbiter Atlantis, which could arrive on site by late next year. The mockup orbiter Explorer is expected to be moved within two or three months, bound for Space Center Houston, Johnson Space Center's visitor center. The boosters include real and replica components, and the external tank is real, restored hardware. Two cranes operated by Beyel Bros. will lift and move each piece onto a transporter. They'll be transferred to a temporary storage on Ransom Road on KSC property. Web posted. (2011). [KSC Visitor Complex making room for Atlantis [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, November 29].]

**November 30: Mobile launcher returns from KSC pad today**

After a two-week "fit check," the mobile launcher for NASA's next exploration rocket began rolling off launch pad 39B at Kennedy Space Center this morning. The roughly 400-foot mobile launch tower and platform made its first trip to the pad Nov. 16, rolling atop the same type of crawler-transporter that carried space shuttles. Engineers wanted to see how much the tower wiggled during the 4.2-mile journey at speeds up to 1.1 mph, data that will be useful in designing the new heavy-lift Space Launch System rocket expected to launch on a test flight in 2017. (Less than two inches of movement was anticipated.) At the pad, the structure was hooked up to power, water and other systems for what NASA project manager Larry Shultz described as fit checks. The mobile launcher was designed for the cancelled Ares I rocket, but NASA plans to modify it for the SLS. NASA has spent $238 million so far. A contract to redesign the base, strengthening it and widening an exhaust hole, is expected to be awarded soon. The modification may cost around $100 million. Then the structure will need to be outfitted with systems needed to launch the new rocket, an unspecified cost. The 6.8-million pound mobile launcher today will return to a park site northeast of the Vehicle Assembly Building. The move began at 10:27 a.m. EST. Web posted. (2011). [Mobile launcher returns from KSC pad today [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, November 30].]

## DECEMBER

**December 1: Reducing the Space Coast's congressional space voice**

A Florida congressional redistricting proposal could cut the Space Coast region's voice in Congress by half. Currently the region has two members in Congress: Rep. Bill Posey, whose 15th district covers the southern part of the region, including the Cape Canaveral Air Force Station; and Rep. Sandy Adams, whose 24th district covers the northern part, including Kennedy Space Center. Under the proposal released this week by the state senate, the 15th district would be redrawn to cover the entire region, from north of Titusville to far south of even the broadest definitions of the Space Coast. Adams's 24th district would move inland, including portions of the Orlando area. This has led to some concerns that the region will lose some of its clout in Congress, which could, in turn, affect space policy. Adams, for example, serves on the House Science Committee; whether she would continue to do so under her new district, or if Posey would seek a seat on that committee, is unclear. Florida state senator Thad Altman tells Florida Today that he's confident Adams would continue to support KSC even after redistricting. What's not mentioned in the article, though, is that both Space Coast representatives have largely had supporting, not leading, roles in recent space policy issues. Neither is an appropriator and their lack of seniority—Adams is in her first term and Posey his second—also limits their influence. Web posted. (2011). [Reducing the Space Coast's congressional space voice [Online]. Available WWW: http://www.spacepolitics.com/ [2011, December 1].]

**December 2: Military's secret shuttle passes test, remains in orbit**

A U.S. military mini-shuttle is flying overtime this week after successfully cruising through nine months of classified operations in low-Earth orbit. Launched atop an Atlas V rocket at Cape Canaveral Air Force Station last March, the unmanned X-37B spacecraft was designed to fly in orbit up to 270 days. It surpassed that mark Wednesday, and Air Force officials are keeping the winged ship aloft for an additional, undefined period of time. "We're extremely proud of this accomplishment," Air Force Lt. Col. Terry McIntyre, X-37B systems program director, said in a statement. Web posted. (2011). [Military's secret shuttle passes test, remains in orbit [Online]. Available WWW: http://www.floridatoday.com/ [2011, December 2].]

**Space Forum results months away**

A report due within 90 days should shed more light on the results from two days of invitation-only space policy meetings this week in Orlando that sought to improve cooperation among states. Representatives from eight states and at least four federal agencies met Tuesday and Wednesday at the U.S. States and Federal Government Space Forum, Space Florida confirmed in a press release Thursday. The conference gathered state and federal policy experts "to discuss ways to increase productive engagement regarding space-related issues in the coming months and years," said Space Florida President Frank DiBello. Partnering to make the U.S. more competitive globally by maintaining a skilled space workforce and lowering costs will become more important in an era of tight government budgets and increased reliance on commercial space activity, according to the meeting's agenda. Participants agreed on opportunities for near-term collaboration, but it may be several months before the U.S. Air Force Academy's Eisenhower Center for Space and Defense Studies, which facilitated the event, produces a report summarizing those key ideas and initiatives. The state aerospace agency cited the use of "Chatham House" procedural rules that promised attendees their comments would remain unattributed to ensure open discussion. In addition to Florida, the agency said state participants came from Alabama, Alaska, California, Virginia, Massachusetts, New York and Ohio. Federal agencies represented included NASA, the Department of Defense, Federal Aviation Administration and Department of Homeland Security. Industry participants included senior executives from United Launch Alliance, SES, SpaceX and Virgin Galactic. NASA Administrator Charles Bolden and Space Foundation CEO Elliott Pulham delivered keynote speeches,

according to the agenda. An "update meeting" is planned in April at a major space conference in Colorado Springs, Colo. Web posted. (2011). [Space Forum results months away [Online]. Available WWW: http://www.floridatoday.com/ [2011, December 2].]

**NASA to issue solicitation for development of SLS**

NASA expects to issue a draft solicitation around Dec. 12 for $200 million worth of research awards it intends to make late next year for the development of advanced booster concepts for the Space Launch System (SLS) heavy-lift rocket. NASA intends to use solid rocket boosters from the space shuttle program to power the SLS core stage on the rocket's early flights — the first of which is targeted for 2017 — and eventually transition to advanced solid- or liquid-fueled boosters promising improved affordability, performance and reliability. Industry will be given until Jan. 13 to comment on the draft solicitation, NASA said in a Dec. 1 synopsis posted on the Federal Business Opportunities website. A final version is tentatively planned for release in February and NASA intends to make a minimum of two awards by October. The contracts would run through March 2015 and are expected to be worth around $25 million to $100 million each, the synopsis said. Web posted. (2011). [News Briefs [Online]. Available WWW: http://www.spacenews.com/ [2011, December 2].]

**December 6: Replica engines installed in Discovery**

Technicians at Kennedy Space Center are outfitting Discovery with replica main engines just over four months before the retired orbiter's planned ferry flight to the Smithsonian Institution. The first of the three replica engine nozzles was installed Monday inside Orbiter Processing Facility-1, where Discovery is being readied for public display. Pratt and Whitney Rocketdyne pieced together the eight-foot diameter nozzles from test articles. An expert in space artifact restoration detailed their black exterior coat of paint to make them look more like flown engines. NASA is keeping 15 flyable shuttle main engines for future use by the Space Launch System, the new heavy-lift rocket being developed for a manned exploration mission by 2021. The engines are expected to be shipped from KSC to NASA's Stennis Space Center in Mississippi, clearing out an engine shop that the Boeing Co. plans to take over for work on a commercial space capsule. NASA is targeting a mid-April ferry flight of Discovery to the Smithsonian's National Air and Space Museum, Steven F. Udvar-Hazy Center in Chantilly, Va., where it will replace Enterprise. Enterprise, a prototype, will be shipped to the Intrepid Sea, Air and Space Museum in New York and Endeavour to the California Science Center in Los Angeles. Atlantis will be towed to the Kennedy Space Center Visitor Complex. Web posted. (2011). [Replica engines installed in Discovery [Online]. Available WWW: http://www.floridatoday.com/ *the flame trench blog* [2011, December 6].]

**Armadillo Aerospace Launches Successfully from Spaceport America**

New Mexico Spaceport Authority (NMSA) officials announced today a successful launch over the weekend of an advanced sounding rocket designed and built by Armadillo Aerospace. The launch took place from Spaceport America's vertical launch complex on Sun., Dec. 4. The test flight was a non-public, unpublished event at the request of Armadillo Aerospace, as the company is testing proprietary advanced launch technologies. Saturday's Armadillo launch successfully lifted off at approximately 11:00 a.m. (MST), which was within the dedicated, five-hour launch window, and reached its projected sub-orbital altitude of 137,500 feet. Web posted. (2011). [Armadillo Aerospace Launches Successfully from Spaceport America [Online]. Available WWW: http://www.spaceref.com/ [2011, December 6].]

**December 7: ULA chief urges NASA to get moving**

The head of the joint venture vying to be part of the effort to deliver NASA astronauts to the International Space Station on a commercial spacecraft wants NASA to decide soon who will win that contract. A speedy decision would provide certainty as the space agency deals with budget pressures roiling Washington, Michael Gass, president and CEO of United Launch Alliance, told an audience at the National Press Club on Tuesday. ULA is a partner of three of the four companies competing for the

commercial crew contract. That means ULA can't favor one partner over another as NASA mulls a final decision, and doesn't have a motive to invest in any one entry, Gass said. ULA is a joint venture formed five years ago by aerospace giants Lockheed Martin and Boeing. In the 60 months since it was formed, ULA has launched 56 Atlas and Delta rockets successfully. Three of the four companies competing for the NASA contract — Boeing, Sierra Nevada and Blue Origin — have proposed using ULA's Atlas V rocket to carry a crew capsule to the space station. The fourth company, SpaceX, is developing its own rocket, the Falcon 9. The Commercial Crew Development Program, as NASA calls it, already is hitting bumps. In February, the Obama administration requested $850 million for the program to proceed with a 2015 launch. But a spending deal lawmakers reached last month would provide only $406 million. NASA officials say they still are evaluating what that will mean for the program, but it's expected to delay a launch until at least 2017 unless funding significantly increases in future years. Web posted. (2011). [ULA chief urges NASA to get moving [Online]. Available WWW: http://www.floridatoday.com/ [2011, December 7].]

**Brevard effect: Space Florida skirts cuts in Scott's plan**

Funding to attract space industry jobs and upgrade facilities would escape cuts next year under Florida Gov. Rick Scott's proposed budget, a victory at a time when overall spending must be cut significantly. Space Florida, the state's aerospace economic development agency, would receive flat funding of $10 million for operations in the fiscal year starting July 1, 2012, if Scott's proposal becomes reality. And the state Department of Transportation would chip in another $15 million for infrastructure improvements expected to help transition some former space shuttle facilities at Kennedy Space Center to new commercial users. Space Florida is working to diversify the state's space industry while it rebounds from the retirement of NASA's space shuttle program this year, which has resulted in about 6,000 layoffs of local contractors since 2009. The agency is partnering with the space center to take over some facilities for potential lease to commercial space companies, such as a shuttle hangar where The Boeing Co. plans to assemble an astronaut capsule. Transportation department funds provided this year are contributing to the refurbishment of that hangar and will help SpaceX expand its Cape Canaveral launch complex to enable more frequent launches, which could produce more jobs. Local officials successfully lobbied for a repeat of that funding next year after the department had omitted it from a five-year work plan. The state money and required matching private investment would go toward renovation of all three shuttle hangars at KSC and work to upgrade existing launch pads for use by commercially operated heavy-lift rockets. Web posted. (2011). [Brevard effect: Space Florida skirts cuts in Scott's plan [Online]. Available WWW: http://www.floridatoday.com/ [2011, December 7].]

**December 9: NASA Sets Feb. 7 Target for SpaceX Launch to Station**

Space Exploration Technologies Corp. (SpaceX) is scheduled to launch its Dragon space capsule toward the international space station Feb. 7 in a flight demonstration that would clear the way for the Hawthorne, Calif.-based company to begin regular cargo runs to the orbital outpost. NASA Deputy Administrator Lori Garver announced the target launch date Dec. 9 during a speech at the NASA Future Forum in Seattle. SpaceX, which has received $376 million from NASA's Commercial Orbital Transportation Services (COTS) demonstration program since 2006, originally planned to conduct two Dragon demo flights before sending the vehicle to berth with the space station for the first time. But after Dragon's Falcon 9 launcher made a successful debut in June 2010, SpaceX began pushing to combine its final two COTS flights into a single mission. In a press release issued immediately after Garver's announcement, NASA said it has conditionally approved SpaceX's request to berth with the station during the upcoming mission. Before Dragon is cleared to berth with the station, NASA said, Dragon will have to prove itself through a series of tests that will include a fly-by of the station at a distance of 3.2 kilometers and a demonstration of the craft's ability to abort a rendezvous already in progress. If Dragon passes these tests, it will perform a final approach to the ISS while the astronauts on board grapple the craft with the station's robotic arm and attach it to the Earth-facing side of the Harmony node. "If the rendezvous and attachment to the station are not successful, SpaceX will complete a third demonstration

flight in order to achieve these objectives as originally planned," NASA said in the release. Once SpaceX proves that Dragon can safely rendezvous and berth with the station, the company will be cleared to begin making regular cargo resupply flights to the ISS under a $1.6 billion NASA contract it was awarded in 2008. Web posted. (2011). [NASA Sets Feb. 7 Target for SpaceX Launch to Station [Online]. Available WWW: http://www.spacenews.com/ [2011, December 9].]

**December 11: Space shuttle model moves to make room for exhibit**

After nearly two decades, a full-scale space shuttle model is being moved from the Kennedy Space Center Visitor Complex which will make room for a new exhibit. NASA crews moved the model Sunday from the Central Florida complex to the Launch Complex 39 turn basin, about four miles away. It will remain there temporarily until being transported by barge in several months to Texas for display at Space Center Houston. The space shuttle's external tank and twin solid rocket boosters were removed in November. A NASA report said the move will also help clear the way for the Kennedy Space Center Visitor Complex to begin building a new facility next year. The Visitor Complex will house retired orbiter Atlantis, whose 33 missions included the 135th and last by a shuttle in July. Officials will break ground in early 2012. Web posted. (2011). [Space shuttle model moves to make room for exhibit [Online]. Available WWW: http://www.cfnews13.com/ [2011, December 11].]

**December 12: Orbital Sciences renames Taurus II rocket "Antares"**

Orbital Sciences Corporation announced Monday that it is renaming the Taurus II rocket it is developing to launch cargo missions to the ISS to "Antares". Company officials explained that a rocket the "scale and significance" of the Taurus II, the largest rocket developed by the company, deserved its own name. The name change also avoids any confusion with the different, smaller Taurus XL rocket, which suffered failures in its last two launch attempts. Antares will initially be used to launch Cygnus cargo spacecraft to the ISS under a contract with NASA, although the company seeks to use the rocket for other medium-class payloads as well. The first Antares launch, a demonstration mission, is planned for early 2012. Web posted. (2011). [Orbital Sciences renames Taurus II rocket "Antares" [Online]. Available WWW: http://www.spacetoday.net/ [2011, December 13].]

**U.S. Air Force Plans Reusable Space Booster**

Stretched between growing operational space demands and shrinking budgets, the U.S. Air Force is funding the first major research phases of a reusable booster system (RBS) intended to replace its costly expendable launchers. Although the value of the initial contracts to Andrews Space, Boeing and Lockheed Martin is only $2 million each, the agreements are potentially worth up to $250 million over the next five years. More importantly, the awards come on the eve of unprecedented budget cutbacks and appear to underline the importance the Air Force attaches to a concept that promises to slash launch costs by more than 50% compared to the conventional Evolved Expendable Launch Vehicle (EELV). The RBS consists of a vertically launched reusable first stage and expendable upper stages. After deploying the upper stack containing the payload, the rocket-powered, winged first stage will return to make an autonomous, aircraft-like horizontal landing near the launch site. Although this and similar jet-powered concepts have been proposed over the years, the Air Force Research Laboratory's RBS Flight and Ground Experiments (RBS-FGE) program is the first to support a funded demonstrator, as well as the first to form part of a sanctioned Air Force Space Command spacelift plan. However, the RBS faces major technology hurdles on the path to planned deployment beyond 2025, when it could begin to replace the current Atlas V and Delta IV vehicles. At the top of the list of challenges is a preferred "rocket-back" maneuver, which was selected by the AFRL over first-stage designs that glide back to land or return using high-speed turbine engines. The focus for the RBS-FGE design is a liquid oxygen/kerosene rocket-powered vehicle that will be able to achieve staging at a higher Mach number than the other options. Following release of the second stage, which could also evolve to a fully reusable vehicle, the first stage will turn around 180 deg. so that its rocket engine is firing in the direction of the velocity vector. This rocket-back maneuver, involving extremely high angles of attack and sideslip, will be tested by a sub-scale RBS Pathfinder

vehicle built by one of the three initial RBS-FGE contractors. The AFRL will select the winning Pathfinder design in the second half of 2012, with flight tests expected to begin in 2015 and run into 2016. Individual contractor designs remain under wraps, but all are similar to the 15-ft.-long reference target Pathfinder that AFRL revealed in 2010, and all are expected to be ground- or air-launched on up to three flights to test different rocket-back maneuvers. Web posted. (2011). [U.S. Air Force Plans Reusable Space Booster [Online]. Available WWW: http://www.aviationweek.com/ [2011, December 12].]

**December 13: Plan for massive space plane unveiled**

A dream team of entrepreneurs announced plans on Tuesday to build the biggest aircraft in history as a way to launch crew and cargo into space -- with flights possibly launching from Kennedy Space Center by the end of the decade. Organized under the name Stratolaunch Systems, the new effort includes luminaries such as Microsoft co-founder Paul Allen, SpaceShipOne designer Burt Rutan, SpaceX head Elon Musk and former NASA chief Mike Griffin. The group aims to manufacture a massive aircraft -- about twice the size of a 747 with a wingspan of 385 feet -- that would carry a missile-like capsule into the atmosphere. Once high enough, the plane would drop the missile, which then would blast itself into orbit with whatever cargo or crew it would be carrying. The executives declined to say how much the vehicle would cost, although they noted it would be an "order of magnitude" greater than SpaceShipOne, estimated to cost $25 million to develop. Much of the work on the project will be done in California, although company officials hinted that launches ultimately could fly from KSC. Indeed, a video showcasing a simulation of the plane's takeoff featured the center's iconic Vehicle Assembly Building in background. That possibility prompted U.S. Sen. Bill Nelson, D-Florida, to write Gov. Rick Scott and ask that the two politicians work together to ensure Stratolaunch chooses the state as a launch site. The KSC area has been hurt badly the retirement of the space shuttle, which cost the region thousands of jobs. With its unveiling, the Stratolaunch spacecraft becomes the latest competitor in the fledgling commercial space business that has emerged in the dusk of the shuttle era. After the final shuttle flight this summer, NASA set on a course to use commercial carriers to ferry crew and cargo to the International Space Station so the agency can concentrate on building a new spacecraft that one day could carry astronauts back to the moon or to nearby asteroids. But the commercial vehicles won't be ready until mid-decade at the earliest and so NASA must rely on Russia to ferry its astronauts to the station until then. The situation has sparked a race among U.S. aerospace companies to develop cheap and reliable spacecraft that can blast into low-Earth orbit. Web posted. (2011). [Plan for massive space plane unveiled [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, December 13].]

**December 14: Shuttle Enterprise's future home now visualized**

With the ownership title now in hand, the Intrepid Sea, Air & Space Museum has unveiled artwork depicting how the space shuttle Enterprise will be displayed within a protective bubble on the aircraft carrier's flight deck starting next summer. NASA's prototype orbiter that performed landing tests in the 1970s will be moved to New York City in April, leaving the National Air and Space Museum's Steven F. Udvar-Hazy Center outside Washington, D.C., where it had been an exhibit since that facility opened in December 2003. The process begins in mid-April when Discovery, the most-flown shuttle with 39 flights to its credit, leaves her homeport at the Kennedy Space Center in Florida atop the modified 747 carrier aircraft for the trek up the eastern seaboard to Washington's Dulles International Airport. Once there, technicians will use a mobile crane system to offload Discovery for handover to the Smithsonian. Enterprise then gets hoisted atop the same aircraft to depart Washington and head for John F. Kennedy International Airport in New York, according to a NASA spokesman. Enterprise will enter temporary storage at the airport before taking a summertime cruise aboard a barge to reach the Intrepid museum complex located at Pier 86 on the Hudson River. Discovery is headed inside the Smithsonian's Udvar-Hazy Center where Enterprise had been parked. National Air and Space Museum took dibs on the most-flown of the surviving orbiters, having orbited the planet 5,830 times and traveled 148 million miles. Enterprise was used in 1977 for approach and landing test flights at Edwards Air Force Base in California, making five free-flights with two alternating crews to demonstrate a shuttle's ability to

perform a powerless touchdown on a runway. Web posted. (2011). [Shuttle Enterprise's future home now visualized [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, December 14].]

**December 15: Capsule builders gain new options**

NASA, which is getting only half the money it wanted to develop privately operated spacecraft, changed course on how it plans to launch the next stage of that program — a move that will provide the space agency with less oversight but more flexibility amid funding uncertainties. The agency's top space-exploration official also told reporters Thursday that NASA is not expecting a new vehicle to be ready until at least 2017 — a year later than initially planned. William Gerstenmaier, associate NASA administrator for the human exploration and operations mission directorate, said the lack of funding made it "really tough" to lock in a firm fixed-price contract with enough companies to keep moving forward on the plan to develop a commercial vehicle to ferry U.S. astronauts to the International Space Station. So they opted for a more flexible contracting procedure under the Space Act that will keep at least two, possibly more, private companies in the running and still allow NASA to sign off when the companies achieve certain milestones. "It gives us some flexibility from a budget standpoint to make as much progress during this time as we move forward," he said. More details about the Space Act agreements, which would extend until early 2014, are expected next week. But the goal would be to advance the development work enough to head to a design certification process and the eventual awarding of a contract. NASA used a Space Act agreement for the first two development phases for the crew taxis and to guide the low-cost development of vehicles to deliver cargo to the station. NASA had hoped to have more than one commercial system ready to fly by late 2016, ending U.S. reliance on Russian vehicles since the space shuttle's retirement in July. Web posted. (2011). [Capsule builders gain new options [Online]. Available WWW: http://www.floridatoday.com/ [2011, December 15].]

**Kennedy Space Center celebrates 'Holidays in Space' with ice rink and more**

Celebrate the holidays aboard the International Space Station without leaving the ground as the Kennedy Space Center hosts "Holidays in Space" through Jan. 1. All the ISS partners — Belgium, Canada, Denmark, France, Germany, Italy, Japan, the Netherlands, Norway, Russia, Spain, Sweden, Switzerland, United Kingdom and the United States — are represented. At the Rocket Garden, a 42-inch Christmas tree features an ISS theme with hundreds of miniature flags, and information from holiday customs of each partner country will be available. Through Dec. 24, Santa and his better half, Mrs. Claus, will be on hand for photos. If you get the munchies, the Cookie Space Station will serve holiday cookies from around the world. Throughout the "Holidays in Space" celebration, part of the Rocket Garden will become an ice skating rink. Enjoy a 20-minute session around the 40-foot rink at a cost of $10 for adults and $8 for children ages 3 to 11. Web posted. (2011). [Kennedy Space Center celebrates 'Holidays in Space' with ice rink, holiday cookies and more [Online]. Available WWW: http://www.floridatoday.com/ [2011, December 15].]

**December 16: Discovery's historic cargo bay goes dark**

After deploying 21 satellites from expansive confines, including the Hubble Space Telescope, commercial spacecraft and military eavesdroppers, hosting scientific platforms and hauling key pieces of the International Space Station, the payload bay of space shuttle Discovery was closed and locked as the spacecraft was powered off for the final time Friday. With commands sent from the firing room in the nearby Launch Control Center, the port door swung shut first, followed by the starboard door. Then the orbiter was powered down forever. The decommissioned ship is getting ready to sail from her Florida spaceport one last time in April. But instead of thundering into orbit she will be departing piggyback atop a 747 carrier jet headed for public display at the Smithsonian. Technicians at the Kennedy Space Center shut the 60-foot-long, clam-shell doors inside Orbiter Processing Facility bay 1 as the "transition and retirement" process winds down on the most-flown shuttle. Discovery's rich history of service featured 39 spaceflights, spanning 148,221,675 miles and 5,830 orbits of Earth. Discovery carried out both shuttle return-to-flight missions in 1988 and 2005 to help America's space program rebound after tragedies,

performed daring satellite repair missions in the early 1980's, deployed the Hubble Space Telescope and the Ulysses solar probe during launches in 1990, did the first rendezvous with the Russian space station Mir in 1995 and final joint shuttle docking in 1998, and played an integral role in building the International Space Station. Construction of Discovery began in August 1979 and the spacecraft was rolled out of the Palmdale factory in October 1983. It became NASA's third operational space shuttle with its maiden voyage in August 1984. As the payload bay goes dark a final time, we remember the remarkable spacewalks that took place in that cargo hold to retrieve a pair of broken spacecraft by Joe Allen and Dale Gardner in November 1984 and successful work to fix a wayward Navy communications satellite by Ox Van Hoften and Bill Fisher in August 1985, Hubble being hoisted out by the robotic arm in April 1990 to open a new window on the Universe or two subsequent return visits to service the observatory by spacewalkers in 1997 and 1999, Mark Lee and Carl Meade floating untethered above the bay in September 1994 to test new emergency jet-powered backpacks, and massive sections of the International Space Station like the Harmony node and Japanese laboratory riding up to the outpost aboard Discovery. It's a bygone era not to be seen again in the foreseeable future. Web posted. (2011). [Discovery's historic cargo bay goes dark [Online]. Available WWW: http://www.spaceflightnow.com/ [2011, December 16].]

**December 19: California Science Center gains additional NASA hardware**

The California Science Center will acquire additional NASA hardware to accompany its planned exhibit of the retired space shuttle Endeavour. The Los Angeles Times reports Monday that the space agency will also give the center a shuttle external fuel tank and two solid-rocket boosters. The huge external tank and twin boosters had previously been on display at Kennedy Space Center in Florida. Endeavour is expected to be brought to Los Angeles late next year. Web posted. (2011). [California Science Center gains additional NASA hardware for space shuttle exhibit [Online]. Available WWW: http://www.orlandosentinel.com/ [2011, December 19].]

**December 21: NASA Official: Commercial Crew Solicitation Expected in February**

NASA will solicit proposals in February for the third phase of a program aimed at developing commercially operated astronaut transportation systems, an agency official said Dec. 20. NASA wants to pick at least two winners by August, Ed Mango, NASA's Commercial Crew Program manager, said during a conference call. Mango described the next phase of NASA's commercial crew program as a "pretty big jump" from the previous two rounds, which focused on developing only individual components of crew transportation systems. "Obviously, this next phase has to be a lot bigger than element designs," Mango said on the Dec. 20 call. In the third phase of the program, NASA hopes to get at least two competing crew transportation systems ready to enter production. More details about the award will be discussed in advance of the solicitation on a public conference call tentatively set for early February, Mango said. With the U.S. space shuttle fleet retired, NASA is looking to get commercially operated successors up and running by 2017. In the interim, U.S., Canadian, Japanese and European astronauts will ride to the space station aboard Russian Soyuz craft at NASA's expense. NASA's Commercial Crew Program has now switched gears twice in 2011. The agency was to have released a solicitation Dec. 19 for a "Commercial Crew Integrated Design Contract" — a 21-month fixed-price contract culminating in a critical design review of at least two proposed astronaut taxi systems. However, the agency announced Dec. 15 that because of budget uncertainty, it was scrapping that contracting vehicle in favor of a similar program funded by Space Act agreements, which are not bound by the Federal Acquisition Regulation that governs traditional government contracts. NASA says it can use Space Act Agreements to fund development efforts — as the agency has done in previous rounds of the commercial crew program — but not to purchase hardware or services. In announcing the shift to Space Act Agreements, NASA human spaceflight chief William Gerstenmaier said the strategy would save the government money, but that NASA would sacrifice its ability to manage the design and manufacturing processes. Space Act Agreements do not give the agency legal authority to dictate requirements to industry, Gerstenmaier said. NASA requested $850 million for its commercial spaceflight activities in

2012 and received an appropriation of $406 million. The NASA Authorization Act of 2010, which made funding recommendations for the agency through 2013, authorized only $500 million for commercial spaceflight. It is not yet clear how much of the $406 million NASA received for commercial spaceflight activities in 2012 will be used for the third round of the Commercial Crew Program. "It will not be $406 million, I can tell you that," Mango said. He added that "the vast majority" of the 2012 funding will be used to continue activities initiated under the Commercial Crew Development 2 program, which began in April and is set to wrap up next July. Web posted. (2011). [NASA Official: Commercial Crew Solicitation Expected in February [Online]. Available WWW: http://www.spacenews.com/ [2011, December 21].]

**December 22: Atlantis put to sleep after 26 years loyal service**

Space Shuttle orbiter Atlantis was powered down for the final time on Thursday, following a 26 year, 33 mission career. With her retirement, the world-famous space ship will at least remain at the Kennedy Space Center (KSC), a spaceport which is continuing to transition its shuttle facilities – as seen with the upping of the pace for "releasing" OPF-1 (Orbiter Processing Facility). The fourth operational orbiter of NASA's fleet, Shuttle Atlantis was named, like her sisters, after previous Earth-bound vessels of exploration. However, unlike her three operational sisters to come before her, Atlantis was named after only one ship and is the only Shuttle orbiter named after a 20th century Earth-bound sailing ship. Atlantis is also the only Shuttle orbiter named after an Earth-bound American research vessel. Specifically, the orbiter Atlantis takes her name from the 1930-1966 two-mastered boat that served as the primary research vessel for the Woods Hole Oceanographic Institute of Massachusetts. Construction of the fourth and originally final Space Shuttle orbiter for NASA's fleet began on January 29, 1979 when NASA awarded the contract to build OV-104 (Orbiting Vehicle 104) to Rockwell International. Start of structural assembly of OV-104's crew module began on March 30, 1980, before engineers at Palmdale began final assembly of OV-104's constituent parts – a procedure which was complete on April 10, 1984. After an additional full year of end-to-end testing of all of her systems, construction was complete, and on April 6, 1985 the new Space Shuttle orbiter Atlantis was rolled out of her construction facility. Three days after Shuttle Atlantis' rollout ceremony at Palmdale, she was transported overland to Edwards Air Force Base, CA where final preparations were made for her cross-country ferry flight – culminating in delivery to the Kennedy Space Center on April 13, 1985: 4 years and one day after the very first Shuttle flight. Atlantis' first mission would be STS-51J, which launched on October 3, 1985. Her Department of Defence (DOD) mission involved her deploying a classified payload, before returning to Earth to landing at Edwards Air Force Base, California at 13:00.08 EDT on runway 23 on October 7. Her final mission was the last flight of the Space Shuttle Program (SSP). Carried out flawlessly, STS-135 was a late addition to the manifest, allowing Atlantis the honor of closing out the program when she returned back to the Kennedy Space Center in July. "It's bittersweet as Atlantis comes home where she will forever stay. I couldn't have more pride in this Space Shuttle team for your service to KSC, NASA, and America. What this team has accomplished over the past 30 years will be talked about and admired for generations to come," noted KSC Director Bob Cabana in an emotional address to the workforce. Work will continue on Atlantis, as she is prepared for going on display in a new facility at the visitor center, which will become her new home late in 2012, or early in 2013. However, with the final task requiring a powered up status – the stowing of the Ku-Band antenna – Thursday morning saw the orbiter put to sleep for one final time. The event – which engineers present at the time noted – was highly emotional, as the "Vehicle Powered" sign was turned off, as it has already been for Discovery, never to be lit again. Web posted. (2011). [Atlantis put to sleep after 26 years loyal service – OPF turnovers [Online]. Available WWW: http://www.nasaspaceflight.com/ [2011, December 22].]

**December 29: Secondary payloads dropped from SpaceX demo**

SpaceX won't launch a pair of small communications satellites during its next demonstration flight for NASA, which is targeted for launch Feb. 7 from Cape Canaveral. The company now plans to launch the prototype Orbcomm satellites as a secondary payload one mission later, during the first commercial

delivery of cargo to the International Space Station, the companies announced in a joint Dec. 28 press release. NASA had been reviewing plans to deploy the Orbcomm payloads on the next flight to ensure they wouldn't interfere with the Dragon capsule's first visit to the station. The press release says the revised launch plan reduces risk for Orbcomm and allows SpaceX to focus on its upcoming demonstration under NASA's Commercial Orbital Transportation Services program. "SpaceX will fully verify the mission performance on the COTS mission and focus on the successful berthing of the Dragon spacecraft to the International Space Station," the release says. In total, SpaceX plans to launch a constellation of 18 Orbcomm OG2 satellites by 2014 on its Falcon 9 rocket. Web posted. (2011). [Secondary payloads dropped from SpaceX demo [Online]. Available WWW: http://www.floridatoday.com/ [2011, December 29].]

**AP: Last shuttle flight is Fla.'s top story**

The end of the space shuttle program after more than three decades of flights to low-earth orbit launched past Gov. Rick Scott's shakeup of state government and the Casey Anthony murder trial as Florida's top story of 2011, according to a poll of newspaper editors conducted by The Associated Press. Atlantis' rolling stop on a Kennedy Space Center runway in July marked the end of the 30-year-old space shuttle program. It was a moment of celebration and apprehension for NASA's thousands of workers and contractors, many of whom lost jobs with the last shuttle flight. The mission itself was pro forma: Atlantis' four astronauts restocked the international space station with a year's worth of supplies and released a satellite. But on the ground, the end of the mission ushered in an era of unprecedented uncertainty for Florida's Space Coast, the site of every shuttle launch, as well as for the nation's space agenda. U.S. astronauts must now depend on Russian Soyuz vehicles for rides to the space station in the near future, and NASA is outsourcing the logistics of sending supplies and astronauts to the space station to private companies. The three remaining active shuttles are being shipped to museums in Florida, Los Angeles and Washington. Thousands of skilled space workers are now looking for jobs in a state with a 10 percent unemployment rate. Web posted. (2011). [AP: Last shuttle flight is Fla.'s top story [Online]. Available WWW: http://www.news-journalonline.com/ [2011, December 29].]

APPENDIX A
2011 SPACE SHUTTLE MISSIONS

**Mission:** STS-133
**Space Shuttle:** Discovery [OV-103]
**Primary Payload:** Permanent Multipurpose Module (PMM)
**Launch Date:** Feb. 24, 2011
**Launch Time:** 4:53:24 p.m. EST
**Launch Pad:** LC-39A
**Landing:** March 9, 2011
**Landing Time:** 11:57 a.m. EST
**Landing Site:** Kennedy Space Center, Fla.
**Mission Duration:** 13 days
**Inclination/Altitude:** 51.6 degrees/122 nautical miles
**Mission Elapsed Time**: 12 days, 19 hours, 3 minutes, 53 seconds
**Total Miles Traveled:** more than 5.3 million
**Official Landing Times:**
Main gear touchdown: 11:57:17 a.m. EST
Nose gear touchdown: 11:57:28 a.m. EST
Wheels stop: 11:58:14 a.m. EST

**Mission:** STS-134
**Space Shuttle:** Endeavour [OV-105]
**Primary Payload:** Alpha Magnetic Spectrometer and ELC-3
**Launched:** May 16, 2011
**Launch Time:** 8:56 a.m. EDT
**Launch Pad:** LC-39A
**Landing:** June 1, 2011
**Landing Time:** 2:35 a.m. EDT
**Landing Site:** Kennedy Space Center, Fla.
**Mission Duration:** 16 days
**Inclination/Altitude:** 51.6 degrees/122 nautical miles
**Mission Elapsed Time:** 15 days, 17 hours, 38 minutes, 51 seconds
**Total Miles Traveled:** more than 6.5 million
**Official Landing Times:**
Main gear touchdown: 2:34:51 a.m. EDT
Nose gear touchdown: 2:35:04 a.m. EDT
Wheels stop: 2:35:36 a.m. EDT

**Mission:** STS-135
**Space Shuttle:** Atlantis
**Primary Payload:** Raffaello Multi-purpose Logistics Module
**Launch Date:** July 8. 2011
**Launch Time:** 11:29 a.m. EDT
**Launch Site:** Kennedy Space Center's Launch Pad 39A
**Landing Date:** July 21, 2011
**Landing Time:** 5:57 a.m. EDT
**Landing Site:** Kennedy Space Center's Shuttle Landing Facility
**Mission Duration:** 13 days
**Inclination/Altitude:** 51.6 degrees/122 nautical miles
**Mission Elapsed Time**: 12 days, 18 hours, 28 minutes, 50 seconds
**Total Miles Traveled:** more than 5.2 million
**Official Landing Times**:
Main gear touchdown: 5:57:00 a.m. EDT
Nose gear touchdown: 5:57:20 a.m. EDT
Wheels stop: 5:57:54 a.m. EDT

Web posted. (2011). [Launch Archives, Space Shuttle Launches [Online]. Available WWW: http://www.nasa.gov/centers/kennedy/shuttleoperations/archives/2005.html [2012, February 28].]

APPENDIX B
2011 NASA EXPENDABLE LAUNCH VEHICLE MISSIONS

**Spacecraft:** Glory
**Launch Vehicle:** Taurus XL
**Launch Site:** Vandenberg Air Force Base, Calif.
**Launch Date:** March 4, 2011
**Launch Time:** 5:09:43 a.m. EST

**Spacecraft:** Aquarius
**Launch Vehicle:** Delta II
**Launch Site:** Vandenberg Air Force Base, Calif.
**Launch Date:** June 9, 2011
**Launch Time:** 10:20 a.m. EDT

**Spacecraft:** Juno
**Launch Vehicle:** Atlas V
**Launch Site:** Cape Canaveral Air Force Station, Fla.
**Launch Pad:** Complex 41
**Launch Date:** August 5, 2011
**Launch Time:** 12:25 p.m. EDT

**Spacecraft:** GRAIL
**Launch Vehicle:** Delta II Heavy
**Launch Site:** Cape Canaveral Air Force Station
**Launch Pad:** Complex 17B
**Launch Date:** September 10, 2011
**Launch Time:** 9:08:52 a.m. EDT

**Spacecraft:** Suomi National Polar-orbiting Patnership
**Launch Vehicle:** Delta II
**Launch Site:** Vandenberg Air Force Base, Calif.
**Launch Date:** October 28, 2011
**Launch Time:** 5:48 a.m. EDT

**Spacecraft:** Mars Science Laboratory, Curiosity Rover
**Launch Vehicle:** Atlas V
**Launch Site:** Cape Canaveral Air Force Station
**Launch Pad:** Complex 41
**Launch Date:** November 26, 2011
**Launch Time:** 10:02 a.m. EST

Web posted. (2011). [2011 Expendable Launch Vehicle Missions [Online]. Available WWW: http://www.nasa.gov/centers/kennedy/launchingrockets/archives/2011.html [2012, February 28].]

## APPENDIX C
## OTHER 2011 U.S. LAUNCHES

**Mission:** NRO
**Launch Vehicle:** Delta IV
**Launch Site:** Vandenberg Air Force Base, Calif.
**Launch Date:** January 20, 2011

**Mission:** NROL-66
**Launch Vehicle:** Minotaur
**Launch Site:** Vandenberg Air Force Base, Calif.
**Launch Date:** February 6, 2011

**Mission:** X-37B
**Launch Vehicle:** Atlas V
**Launch Site:** Cape Canaveral Air Force Station, Fla.
**Launch Date:** March 5, 2011

**Mission:** NRO
**Launch Vehicle:** Delta IV
**Launch Site:** Cape Canaveral Air Force Station, Fla.
**Launch Date:** March 11, 2011

**Mission:** NROL-34
**Launch Vehicle:** Atlas V
**Launch Site:** Vandenberg Air Force Base, Calif.
**Launch Date:** April 14, 2011

**Mission:** SBIRS
**Launch Vehicle:** Atlas V
**Launch Site:** Cape Canaveral Air Force Station, Fla.
**Launch Date:** May 7, 2011

**Mission:** SMART
**Launch Vehicle:** Terrier Improved Orion
**Launch Site:** Wallops Flight Facility
**Launch Date:** June 10, 2011

**Mission:** SMART
**Launch Vehicle:** Terrier Improved Orion
**Launch Site:** Wallops Flight Facility
**Launch Date:** June 23, 2011

**Mission:** DOD
**Launch Vehicle:** Minotaur
**Launch Site:** Wallops Flight Facility
**Launch Date:** June 30, 2011

**Mission:** NRL
**Launch Vehicle:** Minotaur
**Launch Site:** Kodiak, Alaska
**Launch Date:** September 27, 2011