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John F. Kennedy Space Center

A look back at Kennedy Space Center in 2004

New exploration mission excites work force

By *Jim Kennedy*
Center Director

On the day our astronauts take their first steps on the red planet, historians will ask, "When did this journey truly begin?"

They will point back to 2004 and this incredible year in our Agency's history. The year 2004 will undoubtedly go down as one of the most pivotal years in NASA history, when on Jan. 14, President George W. Bush announced America's new Vision for Space Exploration.

The U.S. Congress proved its commitment to our Agency when it endorsed the Vision in November with full funding of the President's proposed budget. Now, let's take a final look at the tremendously successful year that was 2004 at KSC.

We made a commitment to "raising the bar" and surpassing the Columbia Accident Investigation Board requirements and



**Kennedy Space Center
Director Jim Kennedy**



A golden sunrise over the Central Florida coast begins illuminating Launch Pad 39A, shining light on the orbiter access arm and adjoining white room.

by all accounts, we met this challenge. Our team reassembled the major components back onto Discovery, preparing it for testing, and soon it will roll over to the Vehicle Assembly Building.

We completed stacking the Solid Rocket Boosters and very soon the external tank for STS-114 will arrive. Looking forward to the day that we return to the International Space Station, our ISS team has diligently been processing payloads for the Space Station, with the high bay of the Space Station Processing Facility packed full of flight hardware ready to fly.

We are very proud of our Launch Services Program for enabling incredible scientific discoveries. They have ensured successful launches of Gravity Probe B, Aura, Messenger and Swift, and soon, Deep Impact

will launch in just a matter of days, starting 2005 off on the right foot.

We also saw the Mars Exploration Rovers "Spirit" and "Opportunity" exceed all expectations, lasting four times longer than their life expectancy.

In addition to launch and payload processing, we are recognized as having world-class engineers and scientists, with several of our research scientists being awarded Inventor of the Year and top awards in Research and Development. The total list of accomplishments by the KSC work force in 2004 stretches as high as the VAB, too many to begin to list them all here.

We also dealt with adversity provided by Mother Nature with Hurricanes Charley, Frances and Jeanne. But true to their reputation and a commitment of the NASA family, KSC people

helped each other, their communities, and found ways to perform their work after the storms, ensuring a recovery that allowed minimal impact to our mission.

With an eye on the future, the first step in the Vision is returning our Space Shuttles safely to flight. We're on track for a launch in May – June and it will be a tremendous day when Discovery flies again.

Everyone here did a super job in 2004 and in your own special way contributed to our successes. With the new Vision, Americans will return to the Moon, then to Mars and beyond.

I'm excited about where we're heading in 2005 with the Vision guiding our way. I look forward to working with each and every one of you as we meet the challenges of this incredible journey together!

January

NASA's Spirit poises for Mars landing

Members of the Launch Services Program mission team held their breath in anticipation for "Spirit," the first of two Mars Exploration Rovers, to land on the red planet. The rover's twin, "Opportunity," also headed toward Mars. Hours of hard work from the team, made up of NASA's Kennedy Space Center and the Jet Propulsion Laboratory liaison office, soon would pay off.

Omar Baez, KSC Mars Missions launch director, reflected afterward, "The JPL, KSC, Boeing, DOE and Air Force

team pulled together with the great 'spirit' that this nation always puts forth in the quest for 'opportunity.' "

Spirit launched June 10, 2003, followed by Opportunity's July 7 launch, both atop Delta II expendable launch vehicles from Cape Canaveral Air Force Station.

Albert Sierra from the Mission Management office of KSC's Launch Services Program said: "The team worked closely together nearly three years on the integration and launch activities for both missions. I am excited to see the next chapter - the landing on Mars."



Nine-year-old Sofi Collis proudly presents the names she selected for the Mars Exploration Rovers - "Spirit" and "Opportunity" - during a press conference with NASA Administrator Sean O'Keefe.

Bush's new vision sees journeys into cosmos



NASA-KSC senior staff view President George W. Bush's Jan. 14 speech.

In an exciting new Vision for Space Exploration, President George W. Bush called on NASA to prepare for sending humans deeper into space, among other goals. To "gain a new foothold on the Moon and to prepare for new journeys to the worlds beyond our own," the fresh course for America's space program will lead to steady human and robotic exploration of the Moon, Mars and beyond.

In the Jan. 14 speech at NASA Headquarters in Washington, the president said the new course for America's space program would give the Agency a new focus and clear objectives in the future. The vision is based on a series of

goals.

First, America will complete the International Space Station by 2010, with research focused on studying the long-term effects of space travel on humans. After the Station is complete, the Space Shuttle will be retired, having served nearly 30 years of duty.

Bush's second goal calls for the U.S. to begin developing the Crew Exploration Vehicle, with a goal to conduct its first manned mission by 2014. The third goal will be to return to the Moon by 2020, using it as a launching point for missions beyond. The proposed funding for the new initiative will total more than \$12 billion over the next five years.

Shuttle Landing Facility tower rises above landscape

Employees at the Shuttle Landing Facility (SLF) will be much more aware of their surroundings thanks to a new state-of-the-art air traffic control tower under construction.

The new facility rises nearly 100 feet over the midpoint of the runway, giving controllers a spectacular 360-degree view of KSC and north Brevard County. Located south of the SLF's midpoint, the old tower stands only 20 feet above the runway surface, too low to see the launch pads to the east.

The new facility also will replace the SLF Operations

Building. The operations building is home to the Military Radar Unit that monitors KSC airspace 24 hours a day and supervises runway light controls, navigational aids, weather and wind speed instrumentation and gate controls.

In the new tower, the computer displays will be fully modernized to Federal Aviation Administration standards with touch-screen technology.

KSC weather also is monitored around the clock from a weather station that will move into the new building. Construction began in February 2003.



Two control towers are seen at the edge of the KSC Shuttle Landing Facility, the old one in front and the nearly completed new tower in back.

NASA improves view of Space Shuttle launches

The space Agency added more cameras and digital resolution to track the Space Shuttle as it lifts off from Kennedy Space Center. Along with two new camera positions to better examine the Shuttle's ascent, major improvements in tracking capabilities help in fulfilling recommendations of the Columbia Accident Investigation Board.

Cameras at KSC are sited for short-range tracking (T-10 through T+57 seconds), medium-range (T-7 through T+110 seconds) and long-range (T-7 through T+165 seconds). Around

the launch pad, cameras focus on the external tank, solid rocket boosters and orbiter. For several miles up and down the coast, tracking cameras and long-range optical tracking systems capture ascent imagery.

For Return to Flight, two new camera positions have been added to the northeast side of the pad. This ensures a view of the underside of the right wing and the area between the external tank and the orbiter to view any debris during its roll maneuver. Each camera is loaded with 400 feet of film. There are also 42 fixed cameras with 16 mm film.



NASA camera operator Kenny Allen stands in the center console area of one of the recently acquired Contraves-Goerz Kineto Tracking Mounts (KTM).



Raffaello is moved while inside the Space Station Processing Facility.

Space Station processing in high gear

Technicians at the Space Station Processing Facility stayed busy assembling and testing four major Space Station elements for upcoming missions, including Return to Flight mission STS-114. Two major components being processed were the 12A and 13A element power modules that include solar arrays that will deliver the extra power required on the ISS to conduct greater scientific research.

The batteries that were installed prior to the solar arrays as part of the initial design phase need to be tested because of the grounding of the Space Shuttle. The element batteries were stored in a refrigerated unit and a decision could be made to replace the batteries.

"The emphasis is on partnership in everything we do here at Kennedy Space Center and how we work as a team to get the job done," said Bill Dowdell, director of Technical Operations at the SSPF.

U.S. Node 2, the element of the Space Station that will signal "Core Complete" when installed on orbit, is in its final assembly and servicing stage. This stage will show if there are any problems that might need to be addressed before it is launched.

The first two Multi Purpose Logistics Modules (MPLMs), Leonardo and Raffaello (pictured at left), have already flown aboard a Space Shuttle mission and are back in the SSPF to prepare for future missions. These modules are used for transporting science experiments and cargo to and from the ISS.

Donatello is being processed by NASA with engineering support from the Italian Space Agency and The Boeing Co. Even after the ISS is completed, Space Station processing will continue. All three MPLMs will need to go through the processing cycle again to prepare for their next mission.

Spirit rover walks, Opportunity shows Mars

NASA's twin rovers Spirit and Opportunity lived up to their name: Spirit drove a distance of 10 feet in less than two minutes on its first journey on Mars, and Opportunity returned the first pictures of its landing site four hours after reaching the red planet.

"The shots from Opportunity were just unreal of the area they are in," said Omar Baez, NASA-KSC launch director. "It was phenomenal."

As he explained, KSC employees get excited about a very physical stimulus. "We press buttons, smoke pours out

of the rocket, fire comes out, you feel the rumble and you see it go up in space," Baez said. "These guys watch a small signal on a computer screen and get just as excited. The crazy part of that is that it happened five minutes ago, but they've got the same amount of excitement as when you see a launch here."

The photos indicated the spacecraft sat in a shallow crater that was approximately 66 feet wide. Engineers also fixed problems with Spirit's flash memory hardware. The rovers continued to perform past their original mission.



Employees process Opportunity before its Jan. 25, 2004, launch from Cape Canaveral Air Force Station.

Space Shuttle Columbia preservation pays tribute, honors memory

High above the ground, in the 16th floor of Tower "A" in the Vehicle Assembly Building, pieces of Space Shuttle orbiter Columbia are carefully preserved with great respect, to influence the next generation of explorers. Occasionally, one or two of the 83,800 pieces of debris kept at the Center are requested for analysis during Return to Flight activities.

NASA Administrator Sean O'Keefe has designated the last Thursday in January as an annual NASA Remembrance Day. This is a day to take time to remember those who died in the pursuit of

space exploration. Kennedy Space Center senior management unveiled a plaque honoring "Columbia, the crew of STS-107, and their loved ones." The dedication of the plaque was made in front of the 40-member preservation team.

Space Shuttle Launch Director Mike Leinbach thanked the group for their hard work and for the respect they showed in handling the material. "We knew we had to learn from this accident," he said. "Hopefully, we'll be able to build better spacecraft and flight crew systems for the future, which is the whole concept behind this room."



In the Vehicle Assembly Building (from left), Shuttle Launch Director Mike Leinbach, Center Director Jim Kennedy and NASA Vehicle Manager Scott Thurston unveil a plaque honoring "Columbia, the crew of STS-107, and their loved ones."

February

Hundreds honor Columbia's fallen astronauts

On an overcast morning Feb. 1, hundreds of people gathered at the Kennedy Space Center Visitor Complex to pay homage to the fallen astronauts of Space Shuttle Columbia on the first anniversary of the tragedy. Through the tears shared during the remembrance ceremony, the fondness many felt for the crew shone through.

The crowd fell silent for a moment at 9:16 a.m., the target arrival of Columbia at the Shuttle Landing Facility last year. KSC Director Jim Kennedy then thanked the audience for the past year of devotion to the NASA family.

"We do not do this job alone,"

said Kennedy. "We do it with the collective wisdom of this nation, indeed, the world."

He drew an analogy between human emotions and the twin rovers exploring Mars. "While we are proud of that accomplishment, I am talking about the opportunity that we as a nation have to go forward in the wake of the tragedy of a year ago," said Kennedy. "In spite of the loss, the human spirit has been displayed beautifully for the last year."

Dr. Stephen Feldman, president of The Astronauts Memorial Foundation, presided over the event at the base of the Space Mirror.



KSC reorganizes for Space Shuttle Return to Flight

Kennedy Space Center's reorganization began following the Columbia Accident Investigation Board's recommendations for the independence of safety and mission assurance functions. The establishment of the Independent Technical Authority is among the changes.

Another new organization now performs functions of the Chief Engineer and System Management Office and will manage ITA. This office is led by Oscar Toledo and performs the business systems management function.

Additionally, the Spaceport Engineering and Technology directorate realign internally to provide the ITA with engineering technical support. Organizational changes include renaming the Workforce and Diversity Management (WDM) Office to be referred to as the Human Resources Office, and realigning some External Relations and Business Development directorate functions.

WDM Director Rick Arbuthnot and acting deputy director Jenny Lyons led the overall effort. Approximately 200-250 employees are affected.



In the Orbiter Processing Facility, technicians Mike McCall (left) and Jake Jacobson install a Reinforced Carbon-Carbon panel on the right wing of Space Shuttle Discovery. The return to flight planned for Discovery is the STS-114 mission to deliver equipment to the International Space Station.

March

Students from Rockledge and Cocoa Beach high schools were mentored by Kennedy Space Center engineers for this year's Central Florida For Inspiration and Recognition of Science and Technology (FIRST) Robotics Regional at the University of Central Florida Arena.

The competition teams professionals and young people to solve an engineering design problem in an atmosphere similar to a professional sporting event. This year, the event reached more than 20,000 students on more than 900 teams in 27 competitions.

Center engineers lead student robotics team

KSC's "Pink Team" placed high enough in the regional to move on to the next round of competition in New York City, where the team won the championship.

Major sponsors of the competition were treated to a luncheon featuring keynote speakers KSC Director Jim Kennedy and Florida Gov. Jeb Bush, who toured the pit area and talked to students. This year, nearly 180 merit-based scholarship opportunities amounting to more than \$3.8 million were available to eligible FIRST high school participants.



The Kennedy Space Center-sponsored Pink team poses with Florida Gov. Jeb Bush (second from left) and Center Director Jim Kennedy (third from right) during a break at the Florida regional robotics competition held at the University of Central Florida.

Discovery undergoes major technical upgrades



Discovery undergoes its Orbiter Major Modification period.

Through modifications and upgrades to Space Shuttle Discovery during its Orbiter Major Modification period, technicians made important improvements that will total more than a million hours of work. Discovery's overhaul, which began in September 2002, marks the first time an OMM was performed at Kennedy Space Center.

Modifications range from the simple, such as changing a part's label, to something as complicated as the first-time changeout of the orbiter's rudder speed brake's operating mechanism. To allow thorough structural inspections, nearly all accessible

parts were removed, exposing the orbiter's airframe.

Constructed mostly of high-grade aluminum, the airframe is inspected for corrosion and wear. The orbiter also goes through painstaking wire inspections.

It is crucial that any damaged wires or cables are found and fixed. Each orbiter houses approximately 150 miles of wiring.

In the cockpit, a series of flat-panel displays called the Multifunction Electronic Display Subsystem replaced Discovery's original monochrome screens and tape meters. The system displays one of several instruments on any screen.

April

More than 7,500 people took part in the 2004 Kennedy Space Center All-American Picnic, setting a new attendance record. The event offered employees a chance to meet their co-workers' families and friends, and participate in games and fun events.

Under the supervision of Pamela Biegert, picnic committee chairperson and chief of the Education Programs and University Research Division, plenty of food and fun was had by all. The Chili Cookoff Best of Show went

KSC All-American Picnic draws record crowd

to the ELV Rocketeers, while winner of the People's Choice award and Best Storefront went to the BAliens. The event raised \$560 for the American Cancer Society.

The dunking booth gave employees a chance to sink members of management, as well as raise money for charity. The Spaceport Engineering and Technology directorate, with the help of Barry Braden, raised \$318 for the American Cancer Society.

Attendees also enjoyed the egg toss, pie-eating contest and a motorcycle and car show.



Dr. Woodrow Whitlow, deputy Center director, and his daughter enjoy the 2004 All-American picnic.

NASA's Gravity Probe B launches to test theory

NASA's Gravity Probe B, one of the most thoroughly researched programs ever undertaken by the Agency, launched on its mission to test two extraordinary predictions of Albert Einstein's general theory of relativity.

The spacecraft was launched April 20 onboard a Boeing Delta II rocket from Vandenberg Air Force Base to assess how the presence of Earth warps space and time, and how Earth's rotation drags space and time.

The geodetic effect describes how the presence of Earth changes space and time. Visually, it is similar to holding a

bedsheet by four corners and placing a basketball in the center. The bedsheet will slightly wrap around the ball.

Gravity Probe B will also measure the frame-dragging effect of Earth's rotation on space and time. At the heart of the experiment are four gyroscopes, instruments for studying the Earth's rotation by means of a freely suspended flywheel.

As with all NASA missions, the spacecraft/launch vehicle integration and launch countdown management are the responsibility of the Launch Services Program office headquartered at KSC.



Among the most thoroughly researched programs ever undertaken by NASA, Gravity Probe B will measure two parts of Einstein's general theory of relativity by assessing how the presence of Earth warps space and time, and how Earth's rotation drags space and time.

New Florida quarter touts space exploration



The new Florida quarter was unveiled at the Visitor Complex.

The release of the Sunshine State's new commemorative quarter, which features a Space Shuttle and a "Gateway to Discovery" inscription, kicked off at the Kennedy Space Center Visitor Complex. Florida Gov. Jeb Bush and NASA Administrator Sean O'Keefe are among thousands who attend the celebration.

The Florida quarter's design features a Space Shuttle, a 16th century Spanish galleon and the inscription "Gateway to Discovery." A strip of land with palm trees is also depicted.

The new design was submit-

ted by native Floridian Ralph Butler and was chosen from among 1,500 entries.

"Florida truly is the 'Gateway to Discovery,'" said Bush. "Our residents should be proud to know people nationwide will now be carrying a symbol of our state's history, its past and its future."

Each child attending the festivities received a Florida quarter to commemorate the special event. Adults exchanged their dollars and coins for rolls furnished by area credit union representatives. It was the 27th unveiling in the program.

Safety and health efforts help Center become a STAR

Kennedy Space Center was recognized as one of the safest workplaces in the nation by the Occupational Safety and Health Administration. KSC received the flag of the Voluntary Protection Program during a ceremony that named the Center a STAR site, the highest standing in the program.

The VPP recognizes premier worksites where safety and health are integral considerations in all operations, and where programs are continually improved to go above and beyond mere compliance with OSHA regulations.

"Every day, when you look at that flag, realize how special you

are and that you're influencing others," said OSHA Deputy Regional Administrator Teresa Harrison during the flag ceremony in the Operations and Checkout Building's Mission Briefing Room.

KSC officially began the process in December 2000. In July 2003, the effort culminated with an intense OSHA review of the Center's safety and health programs.

"It's exciting to know we did this together as a team," Center Director Jim Kennedy said at the ceremony. "I came here with the expression, 'KSC and proud to be,' but we are also 'VPP and proud to be.'"

Center Director Jim Kennedy, Associate Director Jim Hattaway and Deputy Director Dr. Woodrow Whitlow (from left with hats) help unveil the VPP Star Flag with members of the VPP Star Team.



May

Steidle calls KSC 'operations Center of future'

Conrad Nagel, chief of the Shuttle Project Office (with arms raised), shows Craig Steidle (to Nagel's left) the Space Shuttle Discovery.



Craig Steidle, NASA's associate administrator for the Office of Exploration Systems (pictured in center), made his faith in Kennedy Space Center quite clear during his May 13 tour of the facilities. He stated that KSC will play a pivotal role in making the Vision for Space Exploration a reality.

The reason for his trip was to find out what KSC had to offer, and to match the requirements of Space Vision for Exploration.

"This is certainly the operations center of the future," Steidle said. "It also is the Center around which we will develop those technologies for life-cycle

support of our systems and our infrastructures in the future."

Steidle retired from the U.S. Navy in 2000 and was selected by NASA last January to run the office. That makes him responsible for figuring out the best way to get America back to the Moon and eventually beyond.

His visit to KSC included a tour of the Orbiter Processing Facility, the Space Station Processing Facility and meetings with KSC's leadership.

Shannon Bartell, director of KSC's new Exploration Office, will lead Center efforts to ensure it supports the requirements of the vision.

Roar of launch pad water tests sound suppression

Dozens of loud cheers were drowned out by 350,000 gallons of water rushing across Launch Pad 39A during a sound suppression test. The test confirmed the six new main system valves perform correctly in the water system, which protects the Space Shuttle and its payloads from acoustical damage during launch.

The water is released seconds before ignition of the orbiter's three main engines and twin Solid Rocket Boosters, then flows through parallel 7-foot-diameter pipes to the pad. The system includes a 290-foot-high water tank that empties in 41

seconds.

Water pours from 16 nozzles on top of the flame detectors and from outlets in the Shuttle main engine exhaust hole in the Mobile Launch Platform at main engine ignition.

"We had a lot of our folks here to witness this and it was a good opportunity to get some training out of it," said NASA Test Director Steve Payne. "We needed to do this test after some modifications to our system. The employees replaced a 48-inch valve that had reached the end of its service life. Everything seems to have gone just right."



Employees watch 350,000 gallons of water rush onto Launch Pad 39A.

June

KSC makes Shuttle heat-shield blankets



Damon Petty, with United Space Alliance, removes another insulation blanket from a shelf prior to heat cleaning and waterproofing. The blankets fit inside the nose cap of an orbiter.

For the first time, special heat-shield blankets that protect the Space Shuttle orbiter from intense heat were manufactured "from scratch" at Kennedy Space Center. Formerly made in California, the blankets are now cut, quilted, baked and installed by United Space Alliance at the Center.

Made of a woven ceramic fabric with insulative batting between the fabric layers, they can be as large as 30 inches square and vary in thickness from 1/4-inch to 2 inches. Each set of blankets has a very specific purpose.

Patterns help the team know where to cut the blanket material to the proper measurements. Once the pieces are cut, layers of fabric are sandwiched together with a high-temperature batting to create a blanket piece.

The fabric in the Thermal Protection System blankets is coated with sizing, a substance that acts as a lubricant, to keep the fibers from coming apart when the fabric is woven. The blankets are baked on racks in large ovens similar to pizza ovens. They are heated to 600 degrees Fahrenheit, then to 850 degrees to complete the cycle.

Space Shuttle tile impact tests ensure safety



This 80-foot-long tube fired Space Shuttle debris at speeds up to 1,600 feet per second.

Space Shuttle orbiter tiles experienced heavy impact tests, with ablator projectiles firing into the tiles at speeds up to 1,600 feet per second. The tests, which are part of the Columbia Accident Investigation Board's recommended requirements, help the Agency take even further strides in increasing safety measures for space flight.

Ablator is an epoxy cork composite material used on the Solid Rocket Boosters and External Tank. Along with KSC, test sites include White Sands, N.M., Glenn Research Center in

Cleveland and the Southwest Research Institute in San Antonio.

Small pieces of ablator are shot through an 80-foot-long tube using compressed nitrogen or helium gas as the propellant. Various speeds are used to shoot the projectile toward a target containing bottom orbiter tile test panels, about 6 feet away from the end of the tube.

The results showed the SRB ablator caused damage, a discovery that helped the Orbiter Program determine no amount of ablator may become debris.

July

Exciting new advances in technology created at Kennedy Space Center were examined by NASA's Dr. Paul Curto, who assists in recommendations for the Agency's Space Act Awards. The program awards dollars to inventors for patent applications, tech briefs and software releases.

Earlier in the year, more than 100 NASA civil servants and contractor workers were honored during the 2004 Space Act Awards luncheon. Award recipients were from Artic Slope Research Corp., Bechtel, Boeing, Bionetics, Dynacs, Dynamac, ENSCO, United Space Alliance

KSC shows off new technologies for NASA awards

and Wyle Labs.

The Space Act Awards presented to KSC have grown over the years. In 1998, awards totaled \$97,000; last year, KSC recipients were honored with a total of \$196,000 in awards.

Curto visited workers inside Orbiter Processing Bay 3 for a demonstration of an Orbiter Tile Optical Measurement System, followed by a trip to the Space Life Sciences Lab to see new plant growth experiments.

Inside the Operations and Checkout building, Curto visited a biomedical lab to view personal protective equipment studies, a design visualization lab and the NASA Launch Services Simulation Lab.



Paul Curto (left), chief technologist with NASA's Inventions and Contributions Board, learns from bioengineer Tony Rector (right) about a wastewater processing project Rector is working on in the Space Life Sciences Lab.

August

MESSENGER launches on Mercury mission

NASA's MESSENGER, designed to become the first spacecraft to orbit the planet Mercury, launched aboard a Boeing Delta II rocket from Cape Canaveral Air Force Station. Its goals include determining Mercury's composition and imaging its surface globally and in color.

Launched Aug. 3 at 2:15 a.m. aboard a Boeing Delta II rocket from Cape Canaveral Air Force Station, the 1.2-ton spacecraft was placed into orbit 57 minutes after launch. During a 4.9-billion-mile journey that includes 15 trips around the Sun, MESSENGER will fly past Earth

once, Venus twice and Mercury three times before easing into orbit around its target planet.

With a package of seven science instruments, the mission has several goals, including determining Mercury's composition; imaging its surface globally and in color; and mapping its magnetic field and measuring the properties of its core, among others.

This was the seventh mission in NASA's Discovery Program of scientifically focused exploration projects. The launch was managed by the NASA Launch Services Program at Kennedy Space Center.



Workers process MESSENGER at the Cape Canaveral Air Force Station.

KSC fully assembles Space Shuttle main engine

The first Space Shuttle main engine built at Kennedy Space Center.



Build-up and avionics testing was completed on Space Shuttle Main Engine 2058, the first SSME fully assembled at Kennedy Space Center. Historically, SSMEs were built and assembled at Boeing-Rocketdyne facilities in California. Engine 2058 is the first of five engines to be fully assembled on site.

Processing and assembly work began in February and reached its first major milestone in April when the powerhead unit was mated to the Main Combustion Chamber. The engine is slated for use on the orbiter Atlantis for the STS-115 mission. Each Space Shuttle uses three reusable main engines.

Hurricane Charley grazes KSC with slight damage . . .

Kennedy Space Center suffered minor damage when Hurricane Charley brought high winds that peaked at 87 mph and heavy thunderstorms the evening of Aug. 13.

The Center closed early for normal business at noon due to safety concerns and an "All Clear" was declared the next morning. KSC created an employee assistance hotline in response to the effects and many employees came forward to help.

Thanks to the preparatory actions of KSC's Emergency Preparedness Office, under the direction of Wayne Kee, crews

enacted a deliberate and orderly shutdown of facilities to protect equipment and work areas.

The JBOSC Emergency Preparedness contractor, RPI, who is responsible for implementing the plan, did an exceptional job preparing the Center for the storm, according to Kee. Kee asks every employee to review the Comprehensive Emergency Management Plan, JHB 2000, in the KSC Business World.

The total rainfall for the area was 2.58 inches. The Center never lost utilities throughout the storm.

Employees prepare for Hurricane Charley.



September

. . .but Hurricane Frances is not as kind

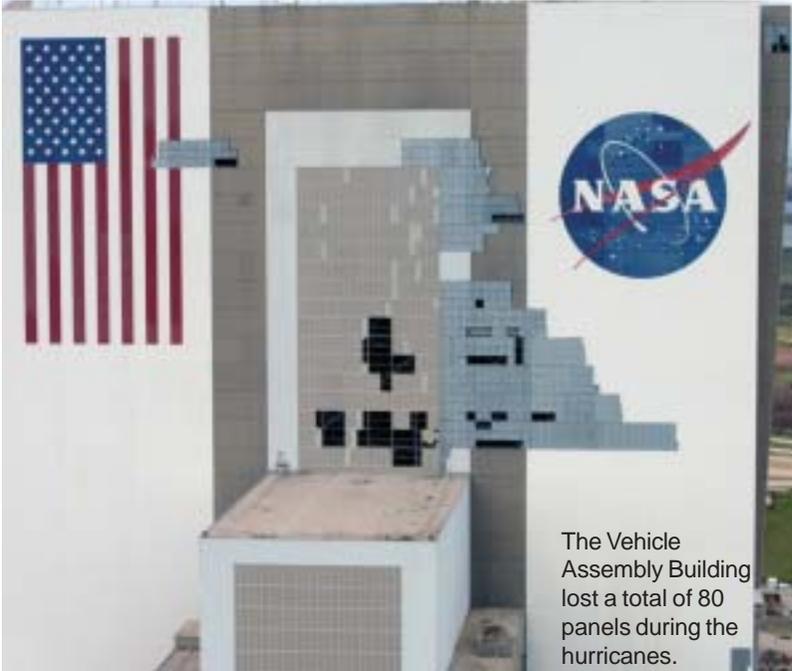
After Hurricane Frances forced an 11-day closure of Kennedy Space Center, nearly 14,000 employees returned to work intent to continue with dedication in spite of the damage caused by the storm. Workers began repairing 80 holes left in the side of the Vehicle Assembly Building.

The storm brought sustained winds greater than 70 mph for 30 hours and gusts as high as 94 mph. Besides the VAB, the Thermal Protection System Facility (pictured left), and the Processing Control Center felt

the most effect from the hurricane. The Operations and Checkout Building, Vertical Processing Facility and some hangars on the Cape side also felt the storm's wrath.

Hurricane preparations began Aug. 30 to protect facilities for the storm that arrived Labor Day weekend. The Center closed Sept. 2 to allow employees a chance to prepare their own homes and evacuate in some cases. The recovery assessment team toured the Center Sept. 6 to secure damaged areas and workers returned Sept. 13.





The Vehicle Assembly Building lost a total of 80 panels during the hurricanes.

Hurricane Jeanne brings round three

Having endured two previous hurricanes, employees were prepared for Hurricane Jeanne that brought strong winds and heavy rain to the area on Sept. 25 and 26. Afterward, employees shared the same thought: We're going to move on and keep focusing on accomplishing our goals.

Around-the-clock work began immediately afterward to repair 80 holes left in the side of the Vehicle Assembly Building, 30 of which were caused by Jeanne. This storm had lower wind speeds, less duration in hours of winds over 50 mph and significantly less rainfall.

Center Director Jim Kennedy was proud of the way the work force prepared for the storm. "As we did with Hurricanes Charley and Frances, the employees did a beautiful job preparing the Center for the storms," he said. "Hardware was tape-wrapped and expensive computer systems were totally wrapped in plastic."

The storm was also the first time the Air Force ride-out team was present at the Emergency Operations Center at the Launch Control Center. The new agreement would have taken place during Frances, but there was no ride-out team because of the anticipated threat.

October

Super Safety and Health Day gives life lessons

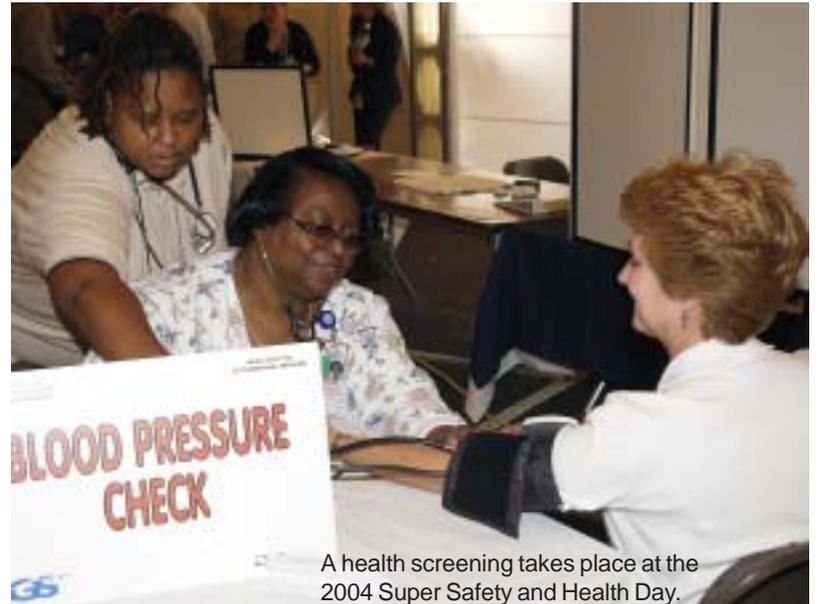
The 2004 Spaceport Super Safety and Health Day offered an assortment of guest speakers and information booths to emphasize the importance of safety and health awareness. Speakers included Olympic gold medalist Bruce Jenner, who explained the rewards of sacrifice, and Dr. Pamela Peeke, who discussed nutrition and fitness.

Our true destiny in life won't be determined by our dreams, Jenner said, but by the decisions we make in our soul, where that champion lives deep inside each of us. "Anytime you want to dream big, much like the way

NASA does, it takes great decisions and sometimes they are tough."

Peeke talked about life changes after the age of 40. "There are three things that affect our bodies," she said. "First is lifestyle and not moving as much. The next is the declining number of sex hormones our bodies produce and the third change is toxic stress, which leads to people being fat."

Later in the day, Center Director Jim Kennedy presided over the second-shift opening ceremony, while Dr. Woodrow Whitlow opened the third-shift ceremony.



A health screening takes place at the 2004 Super Safety and Health Day.

KSC donates most money in Combined Federal Campaign's history



Opening ceremonies for this year's Combined Federal Campaign in the Training Auditorium.

Federal employees at Kennedy Space Center gave the largest sum in the Combined Federal Campaign's history during a fund-raising drive, totaling more than \$389,000 in contributions. This far surpasses the goal of raising \$294,000 for the annual campaign, which helps thousands of non-profit charities nationwide.

More than 82 percent of KSC's employees participated in the fund-raiser. This

year's campaign kicked off at the Training Auditorium, where retired Army Col. Danny McKnight, whose combat duty was the basis for the book and movie, "Black Hawk Down," spoke.

Napolean Carroll, chief financial officer and CFC chairperson, thanked the CFC planning team for putting together a solid plan this year.

"The group is made up of people who believe in what they are doing and they do it well," Carroll said. "As an illustrious history is being written here at KSC for our exploration exploits, let it be known that we care deeply about our fellow man."

November



Swift sits on the launch pad.

Swift launches to seek fleeting explosions

NASA's Swift satellite launched aboard a Boeing Delta II rocket from Cape Canaveral Air Force Station on a mission with international participation. Designed to solve the 35-year-old mystery of the origin of gamma-ray bursts, the satellite will pinpoint the location of distant yet fleeting explosions that appear to signal the births of black holes.

Approximately 80 minutes after the Nov. 20 launch, the spacecraft successfully separated from the Delta second stage.

To track the gamma-ray bursts, Swift carries a suite of

three main instruments. The Burst Alert Telescope will detect and locate approximately two gamma-ray bursts weekly, relaying a rough position to ground control within 20 seconds. The satellite will swiftly reorient itself to bring the burst area into the narrower fields of view of the on-board X-ray Telescope and the UltraViolet/Optical Telescope.

These telescopes study the afterglow of the burst produced by the cooling ashes that remain from the original explosion. For information about this ongoing mission, visit <http://www.nasa.gov/swift>.



NASA's Swift launches Nov. 20

December

Preparations kicked into high gear for the launch of the Deep Impact spacecraft, set at press time to occur Jan. 8 from Cape Canaveral Air Force Station. The mission is the first to explore a comet's interior by using a spacecraft to create a crater, allowing us to look deep inside.

The mission lasts six years; planning started in November 1999. The spacecraft will arrive at Comet Tempel 1 on July 4. On impact, the crater produced is expected to range in size from that of a house to that of a football stadium, and two to

Deep Impact prepares for 2005 liftoff

fourteen stories deep.

Ice and dust debris is ejected from the crater, revealing fresh material beneath. Sunlight reflecting off the ejected material provides a brightening that fades slowly as the debris dissipates into space.

Images from cameras and a spectrometer are sent to Earth covering the approach, the impact and the aftermath. The effects of the collision with the comet will also be observable from certain locations on Earth.

The entire team consists of more than 250 scientists, engineers and educators.



Employees process Deep Impact for its January launch.

STS-114 Return to Flight astronauts train at Center



While training at the Center, the STS-114 crew poses with the employees in the Solid Rocket Booster Assembly and Refurbishment Facility. **Kneeling at far left** is Roger Elliot, director of design engineering for SRB Elements, United Space Alliance; next are Mission Specialists Stephen Robinson and Wendy Lawrence; Commander Eileen Collins; Mission Specialists Charles Camarda and Andrew Thomas; at center is Paul Gutierrez, associate program manager in SRB Elements; Pilot James Kelly; Mission Specialist Soichi Noguchi; and astronaut Steven Frick.

A look back at Kennedy Space Center in 2004



At the turn basin in Launch Complex 39, KSC workers move External Tank 118 into the barge that will transport it to NASA's Michoud Assembly Facility in New Orleans for Return to Flight modifications.



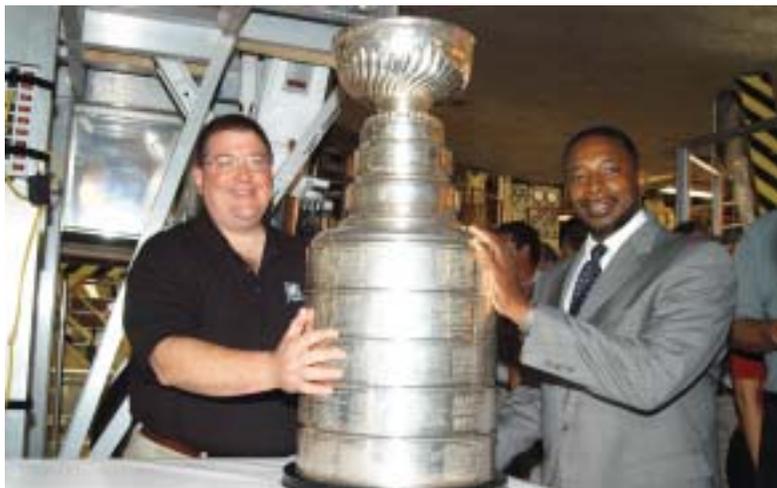
A worker in Hangar AE at the Cape Canaveral Air Force Station meticulously cleans the inside of a Boeing Delta fairing that will encapsulate the Swift spacecraft.



Representatives of the NASA-Kennedy Space Center and the state of Florida prepare to cut the ribbon officially opening the Space Life Sciences Lab at a ceremony at the new lab. In the front row, from left, are Dr. Samuel Durrance; Jim Kennedy, director of KSC; Frank Brogan; Toni Jennings, lieutenant governor of the state of Florida; and Catherine and Grier Kirkpatrick, children of the late Sen. George Kirkpatrick.



In the KSC Space Life Sciences Lab, Dr. Hyeon-Hye Kim checks plants in a growth chamber.



Jay Feaster, general manager of the National Hockey League 2004 Champions Tampa Bay Lightning, displays the Stanley Cup. At right is KSC Deputy Director, Dr. Woodrow Whitlow.



A dolphin surfs the wake of a research boat on the Banana River. Kennedy Space Center is surrounded by marshes and creeks, part of the Merritt Island National Wildlife Refuge which shares a boundary with the Center.



John F. Kennedy Space Center

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