NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

January 8, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 1-99

KSC LOOKS BACK AT 1998 ACCOMPLISHMENTS WITH AN EYE ON THE FUTURE

In 1998, Kennedy Space Center was both a witness to history and a history-maker, as America's spaceport hosted space legends and anniversary celebrations, as well as launching the United States' first component and construction mission of the International Space Station. In doing so, KSC is now competently and competitively poised to greet and lead in the new millennium.

By the year's end, five Space Shuttles had launched from KSC, carrying 35 crew members into space, logging more than 21.9 million miles and carrying many major payloads into orbit.

Last year, America's spaceport hosted President Bill Clinton as witness to the launch of space pioneer John Glenn Jr. on mission STS-95. Glenn is now the oldest American to fly in space at age 77, and Clinton is the first U.S. president to witness a Space Shuttle launch first-hand.

U.S. Secretary of State Madeleine Albright was on hand to see the launch of the Unity connecting module on STS-88 in December. During the mission, the crew joined Unity with the 22-ton unmanned Zarya control module already on orbit, beginning the first construction effort of the International Space Station (ISS).

The next Shuttle assembly mission to the station is STS-96, scheduled for launch aboard Discovery in May.

The diversity of tasks undertaken by KSC workers reflected the center's commitment to keeping the Shuttle a valuable resource, while positioning itself to support future launch vehicles and missions.

The top priority, in line with Kennedy Space Center's guiding principles, was safety, as the center participated in its first Super Safety Day on July 16. All normal work activities, with the exception of mandatory services (fire, security, cafeteria, and buses) were suspended to focus exclusively on safety.

Safety was also a burning issue during the summer of 1998 as brush fires raged through central Florida. In June, Florida's Division of Forestry called on KSC to help through the use of its helicopter, an infrared camera, a global positioning satellite system, and operating crews. KSC also committed about 33 percent of its fire-fighting resources to battle wildfires.

Also provided was NASA's rail car tanker loaded with 20,000 gallons of water. KSC workers had to fabricate a special elbow connection to the tanker so it could fill empty fire trucks waiting in north Brevard County.

During the year KSC achieved its goal of receiving ISO 9001 certification, an international standard for quality management systems, but the majority of the KSC workers' time during the year was spent processing Shuttle and space hardware and payloads, in addition to planning and preparing for next-generation launch vehicles.

Advanced Development and Shuttle Upgrades

KSC made major gains as a developer of advanced technology, winning a cryogenic testbed to provide automated umbilical design input to Boeing and to other projects.

The past year saw completion of a study to evaluate a series of potentially less toxic orbiter Thermal Protection System (TPS) waterproofing agents to reduce the hazard level and impact of current TPS waterproofing operations on the thousands of tiles on the four orbiters.

Additionally, the first phase of a study on Standard Payload Carriers for the Shuttle was completed. The objective was to provide standard orbiter-to-payload carrier interfaces with unique payload interfaces within the carrier. This has the potential to greatly reduce payload integration operations.

During STS-95, Payload Specialist and septuagenarian John Glenn Jr. had his health monitored as part of experiments on the aging process, and the orbiter, too, was the subject of scrutiny. Fifteen-year-old Discovery had readings taken from 30 sensors located throughout its aft compartment main propulsion system and power reactant storage distribution system. This flight of the Integrated Vehicle Health Management (IVHM) technology demonstration was the first time a KSC-developed vehicle system was flown on a mission.

The sensors installed as part of IVHM included KSC-developed smart sensor technology for hydrogen and oxygen detection as well as main propulsion system vacuum-jacketed line pressure.

The KSC-developed Fiber Optic Flight Experiment on the same flight tested the ease of installation and durability of fiber optics on orbit. The long-term objective is to use fiber optics to standardize interfaces in the payload bay, thus helping to reduce processing time in the Orbiter Processing Facility.

More good news was received in 1998 with the awarding of $1.4 million from the Future-X Program to KSC for development and demonstration of IVHM technologies with Ames Research Center and Lewis Research Center on the first Future-X vehicle that will fly as a Shuttle payload in 2002.

Shuttle Mission Highlights

Five Shuttle missions were launched in 1998, starting with STS-89, which highlighted the continuing cooperative effort in space exploration between the United States and Russia. It was the eighth mission to the Russian Space Station Mir and the fifth involving an exchange of U.S. astronauts. Dave Wolf, M.D., on Mir since September 1997, was replaced by Andrew Thomas, Ph.D.

The second mission of the year was STS-90, during which the nearly 16-day Neurolab

mission focused on research to contribute to a better understanding of the human nervous system.

STS-91 marked the final Shuttle/Mir docking mission in Phase One of the International Space Station Program, a precursor to maintaining a continuous American presence in space and developing the procedures and hardware required for an international partnership in space. The STS-91 landing on June 12 culminated 977 total days spent in orbit by the seven U.S. astronauts aboard Mir.

STS-91 also saw the first use of the super lightweight external tank, which is the same size as the external tank used on previous launches, but about 7,500 pounds lighter. The tank's structural design was improved, and its walls now provide added strength and stability, improving payload capacity on flights to the International Space Station.

STS-95, which launched Oct. 29, was perhaps the most highly publicized mission in decades due to the return to space of John Glenn Jr. The mission also included a variety of science experiments in the pressurized SPACEHAB module, the Spartan free-flyer payload, the Hubble Space Telescope Orbiting Systems Test and International Extreme Ultraviolet Hitchhiker payloads.

Because of Glenn's historic return to space as a 77-year-old astronaut, KSC was host to over 2700 members of the media (the most for a single launch since Apollo 11) and about 44,000 VIPs and guests. Hundreds of thousands watched the afternoon launch from the roadways, causeways and beaches of Brevard County.

Wrapping up the year, STS-88 enjoyed tremendous success with the mating of the Unity connecting module with Zarya, completing the first assembly work of the International Space Station.

All five Shuttle missions in 1998 landed at KSC.

The orbiter Atlantis rejoined the fleet in late September, returning from Palmdale, CA, where 443 structural inspections and at least 150 major modifications were made, including the first fully digital cockpit to be placed in an orbiter.

Also, all four orbiters were repainted with the familiar red, white and blue NASA logo, affectionately called the "meatball."

Expendable Launch Vehicles

As lead center for NASA's acquisition and management of expendable launch vehicle launch services, KSC enjoyed a successful year. KSC's Expendable Launch Vehicle team supported many major missions carrying NASA payloads - including Lunar Prospector in January, Deep Space 1 in October, and the Mars Climate Orbiter in December, all from Cape Canaveral Air Station.

From Vandenberg Air Force Base in California, the KSC expendable launch team supported the successful launch of the Student Nitric Oxide Explorer in February, the Transition Region and Coronal Explorer in April, and the Sub-millimeter Wave Astronomy Satellite in December.

International Space Station

The past year saw the commencement of the largest international peacetime scientific program in history: the launch and construction of the first elements of the International

Space Station.

A Russian Proton rocket carried the Zarya control module to orbit, lifting off from the Baikonur Cosmodrome in Kazakstan on Nov. 20. The Unity connecting module lifted off aboard the Space Shuttle Endeavour on Dec. 4 from KSC's Launch Pad 39A.

Payloads for the ISS that arrived in 1998 for processing at KSC included Unity, the Leonardo Multipurpose Logistics Module, the Z-1 Integrated Truss Structure and the U.S. Laboratory.

Kennedy Space Center is well underway preparing for the next U.S. assembly flight, STS-96, which is a logistics and resupply mission for the International Space Station.

Reusable Launch Vehicles

Significant portions of X-33 ground support equipment were designed and fabricated at KSC, including Ground Interface Modules, umbilicals, and hold-downs. KSC workers also performed the lion's share of the X-33 Environmental Impact Statement.

KSC and the Spaceport Florida Authority began construction of a Reusable Launch Vehicle Support Complex near the Space Shuttle Landing Facility on Dec. 18.

Also, NASA exercised an option in its X-34 contract with Orbital Sciences Corp., Dulles, VA, for 25 additional test flights during a 12-month period beginning immediately after the initial contract is complete.

Once the X-34 has demonstrated safe and reliable performance at White Sands in New Mexico, the project will be moved to KSC for a significant number of test flights.

Mars Exploration

The Mars Climate Orbiter was launched from Cape Canaveral Air Station Dec. 11 followed by the Mars Polar Lander Jan. 3, 1999. Together, these spacecraft will contribute to NASA's scientific goals of observing the Martian climate to look for hints that primitive life may have existed during Mars' early history.

Also, two Mars environmental chambers - one in the Operations and Checkout Building and a prototype lab behind the Launch Equipment Test Facility - are under development. They will simulate Mars' atmospheric pressure and constituency, dust and thermal environment.

Contracts and Facilities

In August, Space Gateway Support of Herndon, VA, was selected for award of a government contract to perform base operations for KSC and the U.S. Air Force's 45th Space Wing, including Cape Canaveral Air Station and Patrick Air Force Base.

To save money, reinvest savings and consolidate functions with the objective of remaining competitive in a global launch market, this new Joint Base Operations Support Contract will save the government a substantial sum during the years of the contract. The cost-plus award fee contract features a five-year basic performance period that began Oct. 1.

KSC's Space Shuttle Main Engine Processing Facility opened July 6. A major addition to the existing Orbiter Processing Facility bay 3, the new facility replaced the Shuttle Main Engine Shop located in the Vehicle Assembly Building.

KSC and Spaceport Florida Authority agreed to begin plans to construct a $15-million facility on KSC property to function as a research laboratory. The Space Experiments Research and Processing Laboratory will consolidate life sciences research activities, replacing the old Hangar L facility, and be the core for commercialization initiatives for a wide range of users.

In 1998, KSC was designated the lead center for NASA Acquisition Pollution Prevention, established to reduce or eliminate hazardous shared materials and volatile organic chemical uses from the design, production and operation in NASA programs.

Also, the 525-foot-tall Vehicle Assembly Building, KSC's most visible landmark, received a make-over. Over 700 gallons of paint were used to repaint the 23,437-square-foot American flag and to replace the 22-year-old bicentennial symbol with the NASA logo.

Tourist Destination Upgrades

Under the oversight of Delaware North Park Services, two new tourist destinations opened Jan. 16 to draw visitors into the heart of Shuttle launch operations and offer a close-up look at preparations for on-orbit construction of the International Space Station.

The Launch Complex 39 Observation Gantry is located halfway between the Vehicle Assembly Building and the Shuttle launch pads.

The International Space Station Center is located adjacent to the Space Station Processing Facility and features a viewing window into the ISS payload processing bay. By year's end, 2.75 million individuals visited KSC's Visitors Complex in 1998.

Community Outreach and Education

KSC's contributions through the 1998 Combined Federal Campaign exceeded its goal by nine percent, with more than $228,736 given by Civil Service employees.

In conjunction with National Engineering Week, Feb. 22-28, KSC hosted about 100 local middle school students for NASA Engineering Day activities on Feb. 9.

Through NASA's Mission to America's Remarkable Students educational outreach program, students from around the state and across the nation participated in various science experiments carried into space aboard the Space Shuttle.

Also, the center's new multipurpose display won several awards in 1998, while representing KSC in state, regional and national events, showcasing the KSC Center of Excellence while educating the public and KSC customers as well.

Go to the *KSC Press Releases* Home Page

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

January 8, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 2-99

KSC PUBLIC AFFAIRS DEPUTY DIRECTOR DAVID DICKINSON RETIRES

David Dickinson recently retired from NASA after 28 years of government service. He was designated as the acting director, Public Affairs Office, at KSC in April 1998. He had been deputy director of the Public Affairs Office since January 1993.

During his time in the KSC Public Affairs Office, Dickinson directed the center's media services programs; educational outreach programs; guest services activities, tours and briefings; and the KSC Visitors Center.

Dickinson began his NASA career in 1985 as a personnel management specialist at KSC and was appointed chief of training in 1988. He managed all NASA training and development programs at KSC, the Senior Executive Service personnel system and the Drug-Free Workplace Program.

Prior to joining NASA, Dickinson served in agency-level positions with other Federal organizations in Washington, DC, including:

- Director of Personnel, the Peace Corps (1982-1985)
- Director of Congressional Liaison and Public Affairs, Federal Labor Relations Authority (1979-82)
- Staff Director of the Labor Relations Task Force, President's Reorganization Project (1977-79)
- Assistant Director for Policy Development, Office of Labor-Management Relations, U.S. Civil Service Commission (1970-1977)

During the previous 10 years, he worked as a reporter with the Commerce Clearing House and as an editor with The Bureau of National Affairs, Inc.

Born in Stoneham, MA, Dickinson graduated from The American University in Washington, D.C., in 1967. He has authored numerous articles and has appeared as a guest lecturer on labor law and Congressional relations. He also has served as a volunteer arbitrator with the Juvenile Alternative Services Program.

Major professional awards presented to Dickinson include the NASA Exceptional Service Medal, the Peace Corps Commendation, a White House Letter of Appreciation, the International Personnel Management Association's Special Service Award, and two consecutive Civil Service Commission Distinguished Service awards.

Dickinson and his wife, Judith, reside on Merritt Island.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

January 14, 1999
KSC Contact: Patti Phelps
KSC Release No. 3-99

THREE KSC WORKERS HONORED BY NASA ASTRONAUTS

Three NASA/KSC employees recently were presented with NASA's prestigious Silver Snoopy Award for service to the Space Shuttle astronauts.

Kathy T. Bryant of Merritt Island, Chief Financial Officer's office; Karen S. Crook of Titusville, Payload Processing Directorate; and William E. Roy of Merritt Island, Logistics Operations Directorate, were presented awards at KSC on Dec. 15 by astronaut Heidi Piper.

Bryant is a Supervisory Accountant. She was praised for being "instrumental in achieving increased efficiencies, data reporting, and customer satisfaction in many areas," astronaut Piper said. The astronaut specifically cited Bryant's work in implementing a new electronic time sheet/job labor sheet and handling new IRS regulatory requirements.

Crook, the Payload Processing Director's executive secretary and personal assistant, was commended for managing the additional tasks that often fall to her. "Your professionalism and dedication to the Shuttle payload missions' customers, and the way you diligently provide leadership, guidance, and encouragement to the Payload Processing employees, has neared you the highest respect from management and your peers," Piper told Crook.

Roy, a Logistics Operations Engineer, drew recognition for providing timely and accurate logistics information to the Space Shuttle launch processing program. "Additionally, you have been instrumental in coordinating NASA and contractor activities to resolve conflicts of delivery dates and schedules," Piper said.

Snoopy, of the comic strip "Peanuts," has been the unofficial mascot of NASA's astronaut corps since the earliest days of human spaceflight. The Silver Snoopy Award was created by the astronauts to honor persons who contribute most to the safety and success of human space flight.

The award is presented to no more than 1 percent of the space center's work force each year. Recipients are given a silver pin depicting the famous beagle wearing a space suit. All the pins have flown on a previous Space Shuttle mission. The awardees also receive a framed certificate and a congratulatory letter signed by the presenting astronaut.

Go to the *KSC Press Releases* Home Page

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

January 14, 1999
KSC Contact: Patti Phelps
KSC Release No. 4-99

KAREN S. CROOK HONORED BY NASA ASTRONAUT

Karen S. Crook, a native of Cordele, GA, and a graduate of Valdosta State College (now Valdosta State University), recently was presented with NASA's prestigious Silver Snoopy Award for service to the Space Shuttle astronauts.

Born in Cordele, GA, Crook graduated in 1972 from Crisp County High School in Cordele. Her mother, Frances A. Spires, lives in Cordele.

Crook lives in Titusville, FL.

Astronaut Heidemarie Stefanyshyn-Piper presented the award to Crook on Dec. 15 at Kennedy Space Center. Crook is an executive secretary and personal assistant to the Payload Processing Director at KSC. She joined the space center in 1986, and her work has been recognized with many awards, including performance awards for each year of service and an employee of the month honor.

She was commended for skillfully handling not only her customary duties but the additional tasks that often come her way. "Your professionalism and dedication to the Shuttle payload missions' customers, and the way you diligently provide leadership, guidance and encouragement to the Payload Processing employees, has earned you the highest respect from management and your peers," Stefanyshyn-Piper told Crook.

Snoopy, of the comic strip "Peanuts," has been the unofficial mascot of NASA's astronaut corps since the earliest days of human space flight. The Silver Snoopy Award was created by the astronauts to honor persons who contribute most to the safety and success of human space flight.

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Go to the *KSC Press Releases* Home Page

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

January 14, 1999
KSC Contact: Patti Phelps
KSC Release No. 5-99

WILLIAM E. ROY HONORED BY NASA ASTRONAUT

William E. Roy, a native of Springfield, MA, and a graduate of Western New England College, recently was presented with NASA's prestigious Silver Snoopy Award for service to the Space Shuttle astronauts.

Born in Springfield, Roy graduated from Chicopee High School in Chicopee, MA, in 1978. After doing his undergraduate work at WNEC, he completed his master's in Industrial Engineering at the University of Central Florida in 1992. His parents, Roland and Gail Roy, live in Chicopee, MA.

William Roy lives in Merritt Island, FL. He is married to the former Laura A. Moore and has two children, Kathleen, 14, and Billy, 5.

Astronaut Heidemarie Stefanyshyn-Piper presented the award to Roy on Dec. 15 at Kennedy Space Center. Roy is a Logistics Operations Engineer working on the Space Shuttle Program. He joined the Kennedy Space Center in 1998, and his work has been recognized with several awards.

He was commended for providing timely and accurate information in support of Space Shuttle launch processing. "You have been instrumental in coordinating NASA and contractor activities to resolve conflicts of delivery dates and schedules," astronaut Stefanyshyn-Piper told Roy.

Snoopy, of the comic strip "Peanuts," has been the unofficial mascot of NASA's astronaut corps since the earliest days of human space flight. The Silver Snoopy Award was created by the astronauts to honor persons who contribute most to the safety and success of human space flight.

The award is presented to no more than 1 percent of the space center's work force each year. Recipients are given a silver pin depicting the famous beagle wearing a space suit. All the pins have flown on a previous Space Shuttle mission. The awardees also receive a framed certificate and a congratulatory letter signed by the presenting astronaut.

Go to the *KSC Press Releases* Home Page

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

January 14, 1999
KSC Contact: Patti Phelps
KSC Release No. 6-99

WILLIAM E. ROY HONORED BY NASA ASTRONAUT

William E. Roy, a 1978 graduate of Chicopee High School and the son of Roland and Gail Roy of Chicopee, MA, recently was presented with NASA's prestigious Silver Snoopy Award for service to the Space Shuttle astronauts.

Born in Springfield, MA, Roy earned his undergraduate degree from Western New England College. He completed his master's in Industrial Engineering at the University of Central Florida in 1992.

William Roy lives in Merritt Island, FL. He is married to the former Laura A. Moore and has two children, Kathleen, 14, and Billy, 5.

Astronaut Heidemarie Stefanyshyn-Piper presented the award to Roy on Dec. 15 at Kennedy Space Center. Roy is a Logistics Operations Engineer working on the Space Shuttle Program. He joined the Kennedy Space Center in 1998, and his work has been recognized with several awards.

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Go to the *KSC Press Releases* Home Page

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

January 19, 1999
KSC Contact: George Diller
KSC Release No. 7-99

Note to Editors/News Directors:
STARDUST PHOTO OPPORTUNITY TO BE HELD AT KSC JAN. 22

NASA's Stardust spacecraft, planned for launch Feb. 6, is the subject of a photo opportunity for the news media on Friday, Jan. 22, at 9 a.m. Stardust will fly through the dust cloud that surrounds the nucleus of a comet and for the first time ever, bring cometary material back to earth. Comets may be the oldest, most primitive bodies in the solar system, a preserved record of the original nebula that formed the Sun and the planets. They are also rich in organic material which provided our planet with many of the ready-to-mix molecules that could give rise to life.

For the photo opportunity, media representatives will be taken to the Payload Hazardous Servicing Facility (PHSF) located in the KSC Industrial Area.

Before entering the PHSF, media must submit to a routine security search of camera and utility bags. Due to clean room requirements, media planning to attend are requested to wear long pants and closed-toe shoes, and dress in clean room attire (bunny suits) which will be provided. No suede, leather or vinyl attire or accessories are permitted. Participants are asked not to wear makeup or lotions.

Quality control personnel will request photographers to clean their equipment with alcohol wipes and place accessories in special plastic bags which will be provided. No food, chewing gum, tobacco, lighters, matches, pocket knives or pencils will be permitted inside the clean room. Also, no cellular telephones or transceiver-type radio equipment can be allowed.

Electronic flash photography is permitted. The lighting in the facility is high-pressure sodium (orange).

Ken Atkins, Stardust Project Manager from the Jet Propulsion Laboratory, and Rick Wanner, Assembly Test and Launch Operations (ATLO) manager from Lockheed Martin will be available for questions and interviews about the spacecraft and its mission. This is the only opportunity for the media to photograph Stardust in its launch configuration.

Media representatives needing accreditation should contact the NASA-KSC News Center at 407/867-2468 by the close of business Thursday, Jan. 21. Media will depart the KSC News Center by bus at 9 a.m. for the PHSF.

Stardust is the first U.S. mission dedicated solely to a comet and will capture a sample from the well-preserved comet Wild-2. The spacecraft will also collect interstellar dust from a recently discovered flow of particles that passes through our solar system from

interstellar space. As in the proverbial "from dust to dust," this interstellar dust represents the ultimate in recycled material; it is the stuff from which all solid objects in the universe are made, and the state to which everything eventually returns. Scientists want to discover the composition of this "stardust" to determine the history, chemistry, physics and mineralogy of nature's most fundamental building blocks.

Stardust is scheduled for launch on Saturday, Feb. 6 at 4:07:24 p.m. EST, which is an instantaneous launch opportunity. Liftoff will occur aboard a Boeing Delta II rocket from Pad A at Launch Complex 17 on Cape Canaveral Air Station.

Go to the *KSC Press Releases* Home Page

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

January 28, 1999
KSC Contact: Joel Wells
KSC Release No. 8-99

KSC PROVES SPACECRAFT HANDLING EXPERTISE DURING X-33 LAUNCH SITE TEST

Ninety-three Space Shuttle launches give testament to Kennedy Space Center's excellence in reusable launch vehicle (RLV) handling and ground operations, but what about the next generation RLV? Successful tests at the X-33 launch site this week validated a new, laser-guided vehicle positioning system developed by KSC engineers to help Lockheed Martin meet its goal for rapid turnaround of future RLVs between flights.

Under construction at Lockheed Martin Skunk Works in Palmdale, CA, X-33 is a half-scale prototype of Lockheed Martin's planned operational RLV dubbed VentureStar. Horizontal preflight processing of the technology demonstrator calls for a system to quickly position X-33 on a platform that rotates it to a vertical launch-ready position. Before vertical rotation, cryogenic fuel lines and rigid holddown posts must be connected to the vehicle. These crucial steps call for operational experience.

"With an assertive effort to hand over routine Shuttle operations to the contractor, we've recently been able to apply a wealth of launch processing expertise to research and development projects like this one," said Warren Wiley, KSC's RLV programs manager. "You will be pleasantly surprised when you see our many advanced technology projects come to fruition."

The Vehicle Positioning System (VPS) combines three pneumatic jacks, air-bearing pallets and a laser alignment system to move the estimated 75,000 pound X-33 to its rotating launch platform. During this week's test, a KSC-designed weight simulator called the "iron bird" was lowered by crane onto the VPS in place of X-33, lifted by the pneumatic jacks to platform height and then moved laterally into position above the platform by the air-bearing pallets. The laser beams confirm vehicle alignment. Once rotation begins, it takes about 30 minutes for the unsightly "iron bird" to stand upright marking the test's successful completion. The whole operation takes about one hour.

"One of our overall program objectives is to demonstrate quick turnaround of a launch vehicle," explains Steve Black, Lockheed Martin's RLV program manager over KSC operations. "This system will transition the X-33 from its wheels to the launch mount without the intense manual labor required by conventional systems. It will eventually be completely automated."

X-33 and its support systems are being developed through a cooperative agreement between Lockheed Martin and NASA. This approach has allowed Lockheed Martin to assemble a unique industry/government team that includes KSC engineers who have

traditionally focused on processing the Shuttle.

"We are here first and foremost to support a highly successful Space Shuttle program and the new International Space Station and expect those outstanding services to continue for many years, but these budding RLV development programs are important to KSC," said Roy Bridges, KSC Director. "As NASA's Center of Excellence for Launch and Payload Processing Systems, it makes sense that we're helping in this initiative."

NASA and Lockheed Martin engineers have labored hand-in-hand with United Space Alliance workers at KSC taking advantage of an immense launch support infrastructure. Lockheed Martin initiates developmental efforts like the Vehicle Positioning System project through individual task agreements with NASA and contractually with industry partners.

The X-33 is intended to prove the cutting-edge technologies required for a full-scale RLV such as Lockheed Martin's VentureStar, which is planned for development after the turn of the century. The X-33 is scheduled to make as many as 15 test flights from Edwards Air Force Base, CA, to Dugway Proving Ground, UT, and Malmstrom Air Force Base, MT. Although suborbital, the X-33 will fly high enough and fast enough to encounter conditions similar to those experienced on an orbital flight path to fully prove its systems and performance.

NOTE TO EDITORS: Video of this week's testing activities, conducted at the X-33 launch site on Edwards Air Force Base, CA, will be available at the KSC Press Site on Friday. A video interview with a participating KSC engineer is also available. Digital images will be available at www.ksc.nasa.gov under publisher's photo corner.

Go to the *KSC Press Releases* Home Page

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

January 29, 1999
KSC Contact: George H. Diller
KSC Release No. 9-99

Note to Editors/News Directors:
STARDUST SCHEDULED FOR LAUNCH ON DELTA ROCKET FEB. 6

The launch of NASA's Stardust spacecraft aboard a Boeing Delta II rocket is scheduled for Saturday, Feb. 6, 1999. There is a single instantaneous launch opportunity available that day at 4:06:42 p.m. EST. The next available window is on Sunday, Feb. 7 at 4:04:15 p.m. EST. Liftoff will occur from Pad A at Launch Complex 17 on Cape Canaveral Air Station.

Stardust will fly through the dust cloud that surrounds the nucleus of a comet-and for the first time ever, bring cometary material back to earth. The spacecraft will also collect interstellar dust from a recently discovered flow of particles that passes through our solar system from interstellar space. Comets may be the oldest, most primitive bodies in the solar system, a preserved record of the original nebula that formed the Sun and the planets.

The Stardust spacecraft has completed final checkout at KSC and was mated to the Boeing Delta II at the launch pad on Jan. 28. The Delta fairing is be installed around the spacecraft on Feb. 2.

PRELAUNCH NEWS CONFERENCE

A prelaunch news conference is scheduled for Friday, Jan. 5 at 2 p.m. EST in the KSC News Center auditorium. Participating in the briefing will be:

Dr. Carl Pilcher, Science Director, Solar System Exploration
NASA Headquarters

Ray Lugo, NASA Launch Manager
Kennedy Space Center

Rich Murphy, Delta Mission Director/Flight Director
The Boeing Company

Dr. Kenneth Atkins, Stardust Project Manager/Spacecraft Mission Director
Jet Propulsion Laboratory

Joseph Vellinga, Stardust Program Manager
Lockheed Martin Astronautics

Dr. Donald Brownlee, Stardust Principal Investigator
University of Washington

Joel Tumbiolo, Launch Weather Officer
Department of the Air Force

A post-launch news conference will also be held on Saturday, Feb. 6 at 6 p.m. in the KSC News Center auditorium. The status of the Stardust spacecraft will be provided by the spacecraft mission director at that time.

ACCREDITATION

Those media without permanent accreditation who wish to cover the launch of Stardust including the prelaunch news conference on L-1 day should send a letter of request to the NASA-KSC News Center on news organization letterhead. It should include name, birth date and Social Security number or passport number. Letters should be faxed to 407/867-2692 or addressed to:

Stardust Launch Accreditation
NASA AB-F1
Kennedy Space Center, FL 32899

Stardust mission badges may be picked up at the NASA-KSC News Center between 8 a.m.- 4:30 p.m. beginning Monday, Feb. 1. On Friday, Feb. 5, mission badges may also be picked up at the news media Pass & Identification Building located at Gate 2 on State Road 3 between 11 a.m. and 2 p.m. On launch day, Feb. 6, Stardust mission badges will be available at Gate 1 on Cape Canaveral Air Station located on SR 401 starting at 2:15 p.m. prior to departure for Press Site 1. A Stardust mission badge is required for all news media covering the launch from Press Site 1.

For further information on Stardust launch accreditation contact Lisa Fowler at the NASA News Center at 407/867-2468.

REMOTE CAMERAS

On Friday, Feb. 5 at 3 p.m., a NASA van will depart from the NASA-KSC News Center for Launch Complex 17 for media photographers who wish to establish remote cameras at Pad 17-A.

PHOTO OPPORTUNITY AT LAUNCH COMPLEX 17

A photo opportunity of the Delta launch vehicle for Stardust will be available at Pad 17-A after tower rollback. Media wishing to participate will depart the Gate 1 Pass & Identification Building on Cape Canaveral Air Station at 10 a.m. on launch day, Saturday, Feb. 6.

LAUNCH DAY PRESS COVERAGE

On Feb. 6, media covering the launch should meet at the Gate 1 Pass & Identification Building on Cape Canaveral Air Station. The convoy departure for Press Site 1 will be at 2:30 p.m. After launch, media may leave via Gate 1. Those wishing to attend the post-launch press conference can be escorted from Press Site 1 on Cape Canaveral Air Station to the NASA News Center at KSC after spacecraft separation occurs.

The NASA-KSC News Center will be open on launch day from 9 a.m. until 7 p.m.

NASA TELEVISION AND V CIRCUIT COVERAGE

NASA Television will carry the prelaunch news conference starting at 2 p.m. EST on Friday, Feb. 5. On launch day, countdown coverage will begin at 2:30 p.m. EST and conclude after spacecraft separation from the Delta rocket occurs approximately 28 minutes later. A post-launch news conference will also be carried starting at 6 p.m. EST.

NASA Television is available on GE-2, transponder 9C located at 85 degrees West longitude. Audio only of Stardust events will also be available on the "V" circuits which may be dialed directly at 407/867-1220, 1240, 1260, 7135, 4003, 4920.

RECORDED PRELAUNCH STATUS REPORTS

The NASA-KSC codaphone will carry Stardust prelaunch status reports beginning at L-5 days, on Monday, Feb. 1 and may be dialed at 407/867-2525.

Go to the *KSC Press Releases* Home Page

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

February 4, 1999
KSC Contact: George H. Diller
KSC Release No. 10-99

CHANDRA X-RAY OBSERVATORY ARRIVES AT KSC FOR PROCESSING

The Chandra X-ray Observatory, scheduled to launch aboard Space Shuttle Columbia on mission STS-93, arrived at 2:45 p.m. EST today at the Kennedy Space Center's Shuttle Landing Facility aboard an Air Force C-5 Galaxy airplane. The telescope was shipped from the TRW plant in Redondo Beach, CA, with departure from Los Angeles International Airport occurring earlier this morning. A second airplane also brought the necessary ground support equipment to KSC for the campaign of final prelaunch integration and testing.

The ground support equipment is being off loaded today. The Chandra Observatory is to be taken off the airplane early Friday morning and transported to the Vertical Processing Facility located in the KSC Industrial Area. There, the telescope will undergo final installation of associated electronic components, be tested, fueled, and mated with the Inertial Upper Stage (IUS) booster. A set of integrated tests will follow.

A major milestone is the test using the Cargo Integrated Test Equipment (CITE) to verify that Chandra and the Inertial Upper Stage will have the ability to receive and reply to commands once aboard the Space Shuttle. Also, an end-to-end test will verify the communications systems of the payload and its ability to communicate through the Tracking and Data Relay Satellite system with Mission Control in Houston and the Chandra ground station located in Cambridge, MA. The Chandra/IUS combination will then be ready to go to the launch pad.

Once in the payload changeout room at Pad 39-B, the protective cocoon will be removed from around the telescope and it will be installed into Space Shuttle Columbia. An Integrated Verification Test will be conducted to check all of the electrical connections and the ability of the astronauts to send and receive commands from Columbia's flight deck. The end-to-end test will be repeated at the pad. Finally the IUS will go through a simulated countdown to verify its readiness for launch.

Chandra will use the world's most powerful X-ray telescope to allow scientists to monitor cosmic events that are invisible to conventional optical telescopes. Chandra's X-ray images will yield new insight into celestial phenomena such as the temperature and extent of gas clouds that comprise clusters of galaxies and the superheating of gas and dust particles as they swirl into black holes. Chandra, previously known as the Advanced X-ray Astrophysics Facility (AXAF), is the third in NASA's family of Great Observatories that includes the Hubble Space Telescope and the Compton Gamma Ray Observatory.

Go to the *KSC Press Releases* Home Page

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

February 5, 1999
KSC Contact: George H. Diller
KSC Release No. 11-99

STARDUST PRELAUNCH PRESS CONFERENCE RESCHEDULED

The L-1 day Launch Readiness Review which was scheduled to be held at 9 a.m. today has been rescheduled by the Mission Management Team for 3 p.m. Therefore, the prelaunch press conference for Stardust has also been rescheduled and is now planned to begin at 5 p.m. The event will be carried live on NASA Television.

Media wishing to establish remote cameras at the pad should be at the NASA-KSC News Center at 3 p.m. today for transportation to Launch Complex 17.

On Saturday, media wishing to attend the tower roll-back photo opportunity at the launch pad will depart from the Gate 1 Pass & Identification Building at 10:15 a.m.

Go to the *KSC Press Releases* Home Page

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

February 5, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 12-99

KSC PROVIDED $966 MILLION BOOST TO FLORIDA'S ECONOMY IN FY '98

Space-related employment and contracts at NASA Kennedy Space Center yielded a $966 million boost to Florida's economy during the 1998 fiscal year which ended Sept. 30, 1998. This figure represents $848 million in contract dollars and purchases along with $118 million in civil service personnel compensations.

About 83 percent of the Florida impact dollars, approximately $799 million, was expended within Brevard County. Of the total expenditures, $762 million went to contractors operating on-site at the space center.

An additional $37 million went to off-site businesses in Brevard County, while $49 million was awarded to Florida businesses outside the county. Out-of-state purchases totaled about $154 million.

Over $66 million was awarded in contracts to small, small disadvantaged, and woman-owned businesses. This is a 5.2 percent increase over the projected 13 percent small business goal.

Federal employees at KSC totaled 1801 on Dec. 31, 1998. While about 1140 people were employed through construction and tenant jobs at KSC, the majority of the workers were employed by the on-site contractors and numbered about 9043. Approximately 11,984 workers were employed at KSC through the close of the year. These numbers do not reflect the 1998 civil service buyouts.

Jan. 2 , 1999 was the last day NASA employees could take advantage of the Agency's buyout offer. The downsizing resulted in the voluntary departure of 65 federal employees, leaving KSC with a current civil service work force of about 1732 at this time.

During fiscal year '98, major contractors at KSC included United Space Alliance, the Space Flight Operations Contractor (under contract with Johnson Space Center, Houston, TX); The Boeing Company, the Payload Ground Operations Contractor; Dynacs Engineering Company, Inc., providing engineering services. EG&G Florida was the Base Operations Contractor through the end of FY '98. Space Gateway Systems took over as the joint NASA KSC and Patrick Air Force Base Operations Contractor at the beginning of FY 99.

Go to the *KSC Press Releases* Home Page

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

February 6, 1999
KSC Contact: George H. Diller
KSC Release No. 13-99

STARDUST LAUNCH POSTPONED 24 HOURS

Launch officials scrubbed the launch of the Boeing Delta II rocket carrying NASA's STARDUST spacecraft today one minute and forty-two seconds prior to launch. The scrub was called after engineers noted the vehicle's C-band beacon, used by range-safety tracking radar, showed electrical current levels that were outside pre-set limits established for launch.

The beacon responds to range-safety radar, emitting signals that are used to determine the location of the vehicle during flight. The launch vehicle's beacon signals must fall within certain limits that are pre-established by the Eastern Range.

The one-second launch opportunity did not allow engineers enough time to analyze the data and recycle the launch countdown to make another launch attempt today. The Delta launch team is assessing data to determine its next course of action and is proceeding with plans for another launch attempt tomorrow at 4:04:15 p.m. EST.

The launch weather officer is again predicting a zero percent chance of weather criteria violation for tomorrow's attempt.

NOTE TO EDITORS:

Media covering the STARDUST launch should meet at the Cape Canaveral Air Station Gate 1 Pass & Identification building at 2:15 p.m. News photographers servicing remote cameras should meet at the NASA-KSC News Center at 10:15 a.m.

Launch coverage on NASA Television will begin at 2:30 p.m. A post-launch news conference will be held at the KSC News Center auditorium at 6 p.m., which also will be carried on NASA TV. The NASA News Center will open at 2 p.m.

Go to the *KSC Press Releases* Home Page

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

February 17, 1999
KSC Contact: Joel Wells
KSC Release No. 14-99

A DEEP FREEZE HITS KENNEDY SPACE CENTER

The lowest temperatures of the year are expected to hit KSC in November 1999. By then, a new cryogenics testbed will be busy increasing the spaceport's research and development base and could draw considerable outside attention.

Cryogenic science deals with the production of very low temperatures and how materials behave when exposed to those temperatures. Each time a Shuttle is fueled for launch, it requires more than a half-million gallons of super cold propellant. Liquid hydrogen and liquid oxygen, for example, are at -427 degrees F and -297 degrees F, respectively. KSC's expertise in the day-to-day handling of cryogenic propellants is obvious, but managers hope to use facility upgrades to address challenges that exist outside the Shuttle program.

"Our cryogenics laboratory will soon expand to a larger testbed facility in order to offer research and development capabilities that will benefit projects originating from KSC, academia and private industry," said Maria Littlefield, NASA's cryogenics testbed manager at Kennedy Space Center.

The concept of a new testbed began with a unique partnership between NASA and KSC's engineering development contractor, Dynacs Engineering Co., Inc. A reimbursable Space Act Agreement allows Dynacs, currently conducting on-site cryogenic research for KSC, to manage projects with industry customers while NASA-KSC manages projects with other centers and federal customers. This is the first such arrangement for KSC.

Potential customers exist in a wide range of scientific disciplines and commercial industries. Biological and medical researchers use liquid nitrogen for preservation and storage of human and animal cells and to destroy cancer tissue using cryosurgery. Hospitals use superconductive magnets cooled in liquid helium for magnetic resonance imaging (MRI), and the food industry uses liquid nitrogen for freezing and long-term storage. Expanded cryogenic infrastructure will also posture the Space Coast to support the next generation of reusable launch vehicles (RLV) currently in development.

Once the agreement was finalized, Florida's Technological Research and Development Authority (TRDA) committed $750,000 to expand KSC's cryogenics infrastructure. TRDA was created by the Florida legislature in 1987 to promote economic development and education.

Air Products and Chemicals, Inc., of Tampa, and the University of Florida round out the partnership. Air Products' involvement focuses on private industry applications, while the university focuses on analyzing results.

"This is another example of how KSC is able to use specialized expertise to develop new technologies with outside partners for application in space and here on Earth. The cryogenic testbed is another milestone on KSC's road map toward becoming the Spaceport Technology Center," said KSC Director, Roy Bridges.

Currently, KSC's laboratory includes cryostat test apparatus and high-vacuum equipment necessary for precise thermal measurements of materials exposed to a liquid nitrogen temperature of -321 degrees F. The cryostat measures the heat flow through different insulation systems at various vacuum levels. A dewar test apparatus determines the actual performance of an insulation system under operating conditions.

The expanding testbed, located in KSC's industrial area, is equipped with a liquid nitrogen flow test area to test and evaluate cryogenic valves, flow-meters and other handling equipment in field conditions. A 6,000-gallon tank supplies liquid to low-flow and high-flow test sections. KSC engineers and scientists can also build system prototypes and then field test and analyze them with the center's unique equipment.

KSC's foundation in cryogenic-related research and development started in the early 1990s to support the operational needs of Space Shuttle. Limited cryogenics test capabilities were established, that in turn met a range of NASA needs. In November 1997, NASA's Office for Space Flight designated KSC as an Operational Development and Engineering Testbed and focal point for other NASA field centers to use KSC's unique capabilities and facilities.

Go to the *KSC Press Releases* Home Page

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

February 23, 1999
KSC Contact: George H. Diller
KSC Release No. 15-99

Note to Editors/News Directors:
WIRE SPACECRAFT TO BE LAUNCHED ABOARD PEGASUS XL MARCH 1

NASA's Wide-Field Infrared Explorer (WIRE) spacecraft is scheduled for launch aboard an Orbital Sciences Pegasus XL vehicle on Monday, March 1, during a window which extends from 6:51:50 - 7:01:50 p.m. PST. The drop of the Pegasus from the L-1011 aircraft is targeted to occur within this launch window at 6:57 p.m. PST at a location over the Pacific Ocean approximately 100 miles offshore from Vandenberg Air Force Base, CA.

The WIRE spacecraft will help astrophysicists understand the formation and evolution of "starburst" galaxies. These are important in the overall population of galaxies because almost all of their luminosity is due to star-forming regions representing more than 30 percent of the star formation occurring today. If starburst galaxies have evolved, then they may represent the main source of stars in the universe. WIRE will help reveal the role of starbursts in the evolution of all galaxies, reaching so deeply into unexplored territory that it presents a significant opportunity for scientific investigation.

PRELAUNCH NEWS CONFERENCE

The prelaunch news conference is scheduled to occur on launch day, Monday, March 1, at 1 p.m. PST in the conference room of the NASA Resident Office at Vandenberg Air Force Base. The news conference will be carried on an audio-only basis using the "V" circuits.

Participating in the prelaunch news conference will be:

- Ray Lugo, NASA Launch Manager,
  Kennedy Space Center, FL

- J.R. Thompson, Executive Vice President and General Manager
  Launch Systems Group, Orbital Sciences Corporation

- Jim Watzin, WIRE Mission Director/Manager, Small Explorer Project
  Goddard Space Flight Center, MD

- Captain Eric Barela, Launch Weather Officer
  USAF 30th Weather Squadron, Vandenberg Air Force Base, CA

Media desiring to cover the prelaunch news conference and mission science briefing should meet at the south gate of Vandenberg Air Force Base on California State Road 246 at 12:45 p.m. on Monday, March 1 for escort to the NASA-KSC Vandenberg Resident

Office.

ACCREDITATION

Media desiring accreditation information should contact the Air Force by Friday, Feb. 26 at:

Public Affairs Office
Vandenberg Air Force Base
Telephone: 805/734-8232, Ext. 6-3595
FAX: 805/734-8232, Ext. 6-8303
E-mail: pubaffairs@plans.vafb.af.mil

LAUNCH DAY PRESS COVERAGE

On launch day, media representatives should meet at the Vandenberg main gate at 5:15 p.m. to be escorted to the runway for the takeoff of the L-1011, scheduled to occur at 5:59 p.m. After departure, media will be taken to the viewing room of the NASA Mission Director's Center located at Building 840 on South Vandenberg Air Force Base. From there, media may follow the launch of Pegasus/WIRE.

Assuming a nominal flight of the Pegasus launch vehicle, a post-launch news conference will not be held. However, launch vehicle and spacecraft representatives will be available afterward to informally answer media questions.

NASA TELEVISION AND V CIRCUIT COVERAGE OF PEGASUS/WIRE

The prelaunch news conference will be held at 1 p.m. PST on Monday, March 1 and carried on the "V" audio circuits which may be dialed at Area Code (407) 867-1220, 867-1240, 867-1260, 867- 4003, 867-7135, and 867- 4920. The prelaunch news conference will not be carried on NASA Television.

Launch coverage will carried on the V circuits (audio only) beginning with departure of the L-1011 aircraft at 5:59 p.m. PST, and will conclude after the WIRE spacecraft separates from the Pegasus approximately 10 minutes after launch.

The launch will not be carried on NASA Television. However, launch highlights will be replayed on the NASA Television Video File at 12 p.m. (noon) PST, (3 p.m. EST) on Tuesday, March 2. NASA TV is on GE-2, Transponder 9C located at 85 degrees West longitude.

PEGASUS/WIRE NEWS CENTER

The Pegasus/WIRE News Center at the NASA-KSC Vandenberg Resident Office will be staffed starting Saturday, Feb. 27 and may be reached between 8 a.m. and 4:30 p.m. PST at 805/734-8232, Ext. 5-3051 or Ext. 5-3001. Effective March 1, the extension numbers change from five to seven digits and will be 605-3051 and 605-3001.

A recorded status report will also be available starting on Feb. 27 and may be reached by dialing 805/734-2693.

Go to the *KSC Press Releases* Home Page

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

February 23, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 16-99

APOLLO-ERA HIGH ALTITUDE CHAMBER REACTIVATED TO TEST MODULES FOR THE INTERNATIONAL SPACE STATION

Out of action for more than 20 years, one of two Kennedy Space Center high-altitude chambers formerly used to test Apollo Program flight hardware has been reactivated for use in leak testing International Space Station (ISS) pressurized modules.

Use of the chambers first began in 1965 at KSC to test the Apollo command service modules and lunar service modules. They were last used in 1975 in support of the Apollo-Soyuz Test Project missions. In 1985 the pumping equipment and control room were removed and scrapped and the chamber sat unused until now.

In 1997, in order to increase the probability of successful missions aboard the ISS, NASA decided to perform leak tests on ISS pressurized modules at KSC. Reactivation of the "west" altitude chamber in the Operations and Checkout Building (O&C) high bay was determined the most practical and feasible option for the procedure.

The chamber, 33 feet in diameter and 50 feet tall, is constructed of stainless steel. The rotation handling fixture, which holds the module, is aluminum. After installation of new vacuum pumping equipment and controls, a new control room, and a new rotation and handling fixture, the chamber again becomes operational this month. The chamber is currently undergoing final verification testing.

"The module testing should give us confidence that they are problem free," said Steve Francois, director, Space Station and Shuttle Payloads. "More important, though, is that we'll be able to confirm usage rates of all the gases needed, which could allow us to reduce the quantity carried instead of planning for the worst case. That is more efficient."

To perform the leak test, the module is placed on the rotation and handling fixture inside the O&C high bay, raised to vertical, lifted and moved to a point above the chamber, then lowered inside. Once the lid is lowered and secured, the chamber creates a vacuum environment of 1x10-1 Torr to determine if the module has any leaks.

"The testing simulates a space environment for low earth orbit," said Tommy Mack, project manager for the reactivation of the chamber.

The required vacuum takes six hours to achieve. Testing then begins and, according to Mack, may take "two weeks, depending on what the tests reveal." The first module to be tested will be the U.S. Laboratory, currently located in the Space Station Processing Facility. When the verification testing of the chamber has been completed, the U.S. Lab will be transported to the O&C high bay and placed in the chamber for leak tests. No date

has been determined for the testing.

The chamber is scheduled to be turned over to ISS payload operations on March 1, 1999.

NOTE TO EDITORS: A brief ribbon cutting ceremony recognizing the reactivation of the chamber is scheduled for 2:30 p.m. on Thursday, Feb. 25. Media who desire a tour through the chamber at this time should be at the KSC Press Site by 1:30 p.m. for transport to the O&C high bay.

Expected to attend the ceremony and address attendees are: Roy D. Bridges Jr., KSC director; Jay H. Greene, ISS manager for technical development; Sterling Walker, KSC engineering development director; Steve Francois, Space Station and Shuttle payloads director; and Terry Smith, director of engineering, Boeing Spacecoast Operations.

Go to the *KSC Press Releases* Home Page

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

February 25, 1999
KSC Contact: George H. Diller
KSC Release No. 17-99

Note to Editors/News Directors:
WIRE PRELAUNCH NEWS CONFERENCE TIME CHANGED

The time of the prelaunch news conference for the WIRE spacecraft to be launched aboard a Pegasus rocket has been changed to an earlier time. The news conference is now scheduled to occur at 11 a.m. PST on Monday, March 1.

The event will be held in the conference room of the NASA-KSC Vandenberg Resident Office. Media wishing to participate should meet at the south gate of Vandenberg Air Force Base on California State Road 246 at 10:45 a.m. to be escorted to the briefing.

Launch coverage will be carried on the "V" audio circuits which may be dialed at Area Code (407) 867-1220, 867-1240, 867-1260, 867-4003, 867-7135, and 867-4920. The prelaunch news conference will not be carried on NASA Television.

Launch remains set for 6:57 p.m. PST on March 1, from Vandenberg Air Force Base, CA.

Go to the *KSC Press Releases* Home Page

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

March 1, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 18-99

'FIRST' REGIONAL COMPETITION AT KSC VISITOR COMPLEX MARCH 4-6 PITS HIGH SCHOOL ROBOTIC TEAMS FOR CHANCE AT FINALS

Up to 1600 students from 30 schools around the country will converge on Kennedy Space Center Visitor Complex March 4-6 for a robotics competition. The space center is hosting the 1999 Southeastern Regional event being sponsored by the non-profit organization For Inspiration and Recognition of Science and Technology, known as FIRST.

Practice rounds will commence at noon on Thursday, March 4, and qualifying matches begin at 9 a.m. on Friday, March 5 in the Visitor Complex Rocket Garden, site of the competition.

On Saturday, March 6, elimination matches between student teams begin at 9 a.m. and continue through mid-day. Final matches are scheduled to begin at 1 p.m.

All matches are open to the public.

The FIRST robotics competition is designed to provide students with a hands-on, inside look at engineering and other professional careers. FIRST's goal is to expose students to engineers, help them discover the important connection between classroom lessons and real-world applications and inspire kids to want to learn more. Teams that combine high schools, universities, government, businesses and private industry to build and display the robots have six weeks to design and build a working machine - a robot. The event then pits gladiator robots against each other in an athletic-style competition.

To make this FIRST event possible required a team effort by NASA, KSC contractor organizations, and the surrounding community. Kennedy Space Center Director Roy D. Bridges, Jr. said, "Outreach is at the heart of NASA's and Kennedy Space Center's mission. We should all help to expose young minds to valuable career opportunities as well as to heighten their awareness of the importance of the space program. KSC is proud to host the first regional held in the southeast United States and share our resources, knowledge, and talents with these young people - the space program's future."

Brevard County high schools participating in the regional event include Titusville, Astronaut, Cocoa Beach, Merritt Island, Rockledge, and Satellite Beach.

Corporate sponsors include AT&T, Astronauts Memorial Foundation, Bionetics, Boeing, Brevard Community College, Cape Canaveral Technical Societies, Communication Concepts Inc., Delaware North Parks Services of Spaceport, Inc. (Kennedy Space Center Visitor Complex), Dynacs, Dynamac, Exigent, Florida Institute of Technology, Florida Today, GSMA-Parrish, Harris Corporation, Interface and Control Systems Inc., Lockheed

Martin, Society of Women Engineers and United Space Alliance, and NASA

FIRST annually sponsors several regional events and a national robotics competition. Other events in 1999 are planned around the country in eight locations. The finals are held each year at Walt Disney World's Epcot Center.

Information about regional competitions and all the teams in the nation participating in the robotics competition can be found at www.usfirst.org.

Go to the *KSC Press Releases* Home Page

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

March 16, 1999
KSC Contact: Joel Wells
KSC Release No. 20-99

SHUTTLE MISHAP SIMULATION PROVES KSC EMERGENCY READINESS

Kennedy Space Center will stage a simulated astronaut rescue mission this week, based on the unlikely scenario of a crash landing at the Shuttle Landing Facility (SLF).

After ninety-two successful Space Shuttle landings, no one has ever seen such an event. However, KSC managers will imitate the improbable on March 17 as part of standard training procedures. The Mode 7 astronaut rescue simulation will exercise all aspects of command and control, search and rescue, and medical procedures required for the unlikely contingency.

"When you don't have real mishaps occurring day in and day out, you have to find ways to keep the response team trained and ready," explained Ken Tenbusch, KSC Landing Recovery Director and simulation planner. "We want to design a scenario which will be as real as possible, so that it tests the team and the organizational interaction that must take place for a successful rescue effort. Our rescue forces have not been told what to expect."

The scenario calls for orbiter Discovery to land short of SLF runway 15 during a simulated 9 a.m. landing attempt with a seven-member crew following an 11-day mission. Five astronaut candidates, one representative from the Vehicle Integration Test office, and one fire/rescue worker will occupy an orbiter mock-up placed in a wooded area adjacent to the runway. Though a recovery team will be staged at the SLF, just like a real landing day, the remote location of the mock-up will prevent a completely land based crew rescue. This is a Mode 7 contingency which requires support from the air.

A NASA UH-1 helicopter or "Huey," called Search One, will deploy from the SLF to gain a firsthand, aerial perspective of the fake crash site. The situation is assessed and exact coordinates are then radioed back to four Air Force HH-60 "Jolly" helicopters waiting at the SLF.

The first Jolly deployed will deposit needed emergency equipment at the site. Two of the three remaining helicopters will be staffed with KSC/Cape Canaveral Air Station fire/rescue personnel whose primary mission is to pull the stranded astronaut stand-ins out of the mock-up and prepare them for preliminary triage. If a helicopter landing site can not be identified, fire/rescue workers are required to "fast rope" from their hovering helicopters. A fourth Jolly stands by for additional medical evacuation support. Patrick Air Force Base provides two paratrooper rescue specialists and one medical doctor in each of the four Jollies.

After fire/rescue successfully removes each crew member from the side hatch or overhead

window, Air Force medical personnel will perform preliminary stabilization and decontamination activities at the established casualty collection point about 200 feet from the mock-up. Patients that do not require immediate treatment or airlift to area hospitals can be moved to a mobile, intermediate medical care site about 1,250 feet from the mock-up for further assessment. The exercise concludes when the airlifted patients arrive safely in the emergency rooms of participating area hospitals.

On March, 19, simulation managers and exercise participants will gather for a lessons learned session to review and evaluate the Mode 7 exercise. The many organizations that support Shuttle recovery efforts will apply the insight gained from this exercise during their routine training efforts throughout the year.

NOTE TO EDITORS: Immediately following the exercise, key players in the simulation will be made available to the media for comment and interviews. Interested media should arrive at the KSC Press Site by 10:45 a.m. on Wednesday, March 17 for bus transport to the mock-up crash landing site.

Go to the *KSC Press Releases* Home Page

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

April 5, 1999
KSC Contact: George H. Diller
KSC Release No. 22-99

Note to Editors/News Directors:
LANDSAT 7/DELTA II ROCKET READY FOR LAUNCH APRIL 15

The launch of Landsat 7 for NASA and the U.S. Geological Survey aboard a Boeing Delta II rocket is scheduled to occur on Thursday, April 15 from NASA's Space Launch Complex 2 at Vandenberg Air Force Base, CA. The launch window extends from 11:32 - 11:34 a.m. PDT.

Landsat 7 will gather remotely sensed images of the land surface and surrounding coastal regions of the Earth for global climate change studies, and other government and commercial purposes. Continuity of data with previous Landsat spacecraft is a fundamental goal of the Landsat program. Landsat has provided over 25 years of consistent data of the Earth's continental surfaces.

ACCREDITATION

News media desiring accreditation for the launch of Landsat 7 should fax their request on news organization letterhead to:

John Demko
NASA Vandenberg Resident Office
Vandenberg Air Force Base, CA
FAX: 805/605-3380

Delta/Landsat 7 access badges will be issued upon entry to Vandenberg Air Force Base and will be valid for the prelaunch news conference on L-1 day and for launch day.

For further information on launch accreditation call 407/867-2468. Beginning April 12 call the NASA Landsat 7 News Center at Vandenberg Air Force Base 805/605-3051.

PRELAUNCH NEWS CONFERENCE

The prelaunch news conference will be held on Wednesday, April 14 from 11 a.m. to noon PDT in the main conference room of the NASA Vandenberg Resident Office, Building 840, Vandenberg Air Force Base, CA. Participants will be:

- Dr. Darrel Williams, Landsat Project Scientist
  Goddard Space Flight Center, MD
- Ray Lugo, NASA Launch Manager
  Kennedy Space Center, FL

- Rich Murphy, Boeing Mission Director/Delta Flight Director
  The Boeing Company

- Ken Dolan, Landsat 7 Deputy Project Manager
  Goddard Space Flight Center, MD

- R.J. Thompson, Landsat 7 Program Manager
  U.S. Geological Survey

- Major Eric McKinley, USAF Launch Weather Officer, 30th Weather Squadron
  Vandenberg Air Force Base, CA

Media desiring to cover the prelaunch news conference should meet at the south gate of Vandenberg Air Force Base on California State Road 246 at 10:30 a.m. They will be escorted to the NASA Vandenberg Resident Office.

REMOTE CAMERAS

Media desiring to establish sound-activated remote cameras at the launch pad will depart from the south gate of Vandenberg Air Force Base at 12:15 p.m. for SLC-2.

LAUNCH DAY PRESS COVERAGE

On launch day, April 15, media covering the Delta/Landsat 7 launch should be at the main gate located on California State Road 1 at 10 a.m. to be escorted to the press site located on north Vandenberg Air Force Base. After launch, media will be escorted back to the main gate. A post-launch news conference will not be held.

NASA TELEVISION AND VOICE CIRCUIT COVERAGE

NASA Television will carry the prelaunch news conference starting at 11 a.m. PDT on Wednesday, April 14. On launch day, April 15, NASA TV coverage of the countdown will begin at 10 a.m. PDT and continue through spacecraft separation at 62 minutes into flight.

NASA Television is carried on GE-2, transponder 9C located at 85 degrees West longitude. Audio only will be available on the "V" circuits which may be reached by dialing 407/867-1220, 1240, 1260, 7135, 4003, 4920.

The Landsat 7 News Center at the NASA Vandenberg Resident Office will be staffed beginning Monday, April 12 and may be reached at 805/605-3051. A recorded status report will also be available starting at that time by dialing 805/734-2693.

Go to the *KSC Press Releases* Home Page

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

April 2, 1999
KSC Contact: George Diller
KSC Release No. 23-99

FUSE SATELLITE ARRIVES IN FLORIDA FOR LAUNCH PREPARATIONS

NASA's Far Ultraviolet Spectroscopic Explorer (FUSE) satellite arrived Thursday, April 1 at NASA Hangar AE on Cape Canaveral Air Station to begin prelaunch processing for launch next month.

FUSE will investigate the origin and evolution of the lightest elements in the universe-hydrogen and deuterium. In addition, the FUSE satellite will examine the forces and process involved in the evolution of the galaxies, stars and planetary systems. FUSE will do this by investigating light in the far ultraviolet portion the electromagnetic spectrum.

FUSE processing will begin on Monday, April 5 with the removal of the protective covering which surrounded the spacecraft during shipping. Then a functional test of the satellite's systems will be performed. Other milestones while FUSE is in the ultra-high clean room facility at Hangar AE are the installation of flight batteries and the installation and testing of the solar arrays. There will also be testing of the satellite's communications and data systems while linking FUSE with the spacecraft control center at The Johns Hopkins University, Baltimore, MD.

Meanwhile, at Pad A on Launch Complex 17, preparations will soon be underway to prepare the Boeing Delta II rocket for launch. The first stage will be erected at the pad on April 29 and three solid rocket boosters will be attached to the first stage the following day. The Delta second stage will be hoisted atop the first stage on May 1. FUSE is scheduled to arrive at the pad for mating to the Delta on May 12. Finally, the nose fairing will be placed around the satellite on May 15.

The launch of FUSE is scheduled for May 20 at the opening of a launch window which extends from 11:36 a.m. to 12:48 p.m. EDT.

FUSE was developed and will be operated by The Johns Hopkins University under contract to Goddard Space Flight Center, Greenbelt, MD. The management of the launch is the responsibility of Kennedy Space Center, FL.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

April 5, 1999
KSC Contact: George H. Diller
KSC Release No. 24-99

GOES-L MEDIA OPPORTUNITY SET FOR WEDNESDAY, APRIL 7

The Geostationary Operational Environmental Satellite-L (GOES-L) weather satellite, to be lofted into orbit by a Lockheed Martin Atlas II rocket next month, will be the subject of a news media photo opportunity on Wednesday, April 7. The event will be held at the Astrotech Space Operations facility starting at 10 a.m.

GOES-L is the latest in the current series of advanced geostationary weather satellites in service. Once in orbit it will become GOES-11, joining GOES-8, GOES-9 and GOES-10 in space. GOES-8 and GOES-10 are the two operational GOES satellites, one overlooking the Atlantic Coast and out into the Atlantic Ocean; the other over the Pacific coast and well out into the Pacific Ocean. GOES-9 is currently turned off. After checkout, GOES-L will become the on-orbit spare to be activated when one of the operational satellites needs to be replaced.

Procedures for optically sensitive spacecraft must be followed for individuals entering the cleanroom where the spacecraft is being processed. Guidelines for controlled access to the cleanroom have been developed by quality control personnel and will be monitored prior to entering the facility. Cleanroom attire will be furnished. Photographers may be requested to clean cameras or accessories using alcohol wipes which will be provided.

Long pants and closed toe shoes must be worn -- no shorts or skirts. Non-essential equipment such as camera bags or other carrying cases should be left outside the cleanroom. No pencils or felt-tipped pens can be permitted inside the cleanroom, only ball point pens may be used. Due to the sensitivity of the spacecraft's solar arrays, flash photography will not allowed. There is adequate metal halide lighting in the facility for photography (white with slight green cast).

On Wednesday, media may proceed directly to Astrotech located in the Spaceport Florida Industrial Park, 1515 Chaffee Drive, Titusville. Spokespeople will be available from NOAA, NASA and Space Systems/ LORAL to answer questions and for interviews.

The Atlas II rocket is scheduled to arrive at Cape Canaveral today. The vehicle erection activities at Pad 36-A are currently scheduled to begin April 19. Launch is scheduled for Saturday, May 15 at the opening of a launch window which extends from 2:23 - 4:41 a.m. EDT.

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system will reply with a confirmation via e-mail of each subscription.

Go to the *KSC Press Releases* Home Page

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

April 7, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 25-99

NEW ENTRYWAY AND INFORMATION CENTER ARE GATEWAY TO FUTURE-ORIENTED EXPERIENCE AT KSC VISITOR COMPLEX

Visitors to Kennedy Space Center (KSC) Visitor Complex will now be introduced to NASA and the past, present, and future of space exploration by a new eye-catching ticket plaza and entryway.

Several new presentations depicting a bold vision of our future in space are also now open. They range from a glimpse into the future of human exploration beyond earth orbit, to the search for life elsewhere in the universe and the protection of the natural environment here at KSC.

The $13 million expansion, which was opened to the public earlier this month, includes a new International Space Station-themed ticket plaza, featuring a structure of overhanging solar panels and astronauts performing assembly tasks.

The official grand opening of the additions will be held at 10 a.m. on Friday, April 9. Open to the public, NASA officials, astronauts and the media are invited to attend. The ceremony will feature remarks by KSC Director Roy Bridges and others, including Avery Brooks, a star of the Star Trek-based series Deep Space Nine, and narrator of the new Visitor Complex movie Quest For Life.

"The new entry and these future-focused experiences set the stage for our emphasis on space exploration," said Jim Ball, NASA manager of the KSC Visitor Complex. "These exciting new presentations dealing with the search for life elsewhere in the universe, the preparation for human exploration beyond earth orbit, are intended especially to appeal to our young people, to capture their imaginations and inspire their dreams as we move into a new century and a new millennium. After all, the future belongs to them and their children."

The opening will mark the completion of the latest in a series of upgrades made at the Visitor Complex in recent years. The upgrades have cost about $100 million. Additions - which are being paid for by revenues generated from visitors - include the Apollo/Saturn V Center, the LC-39 Launch Gantry and the International Space Station Center.

Beyond the new International Space Station-themed ticket plaza at the Visitor Complex is an all-new information center which welcomes visitors to the "... Gateway to The Universe." It also offers an orientation video and a display honoring the center's namesake, President John F. Kennedy. Five large video walls provide an introduction to the range of activities and exhibits at the Visitor Complex. Staff are available at the

expanded information counter to answer questions and help visitors plan their day. Information is available in seven languages.

Admission to two of the new experiences, Robot Scouts and Quest For Life, are included in the price of a tour ticket or combination tickets.

The walk-through exhibit Robot Scouts tells the story of the unsung heroes of space exploration, NASA's robotic probes. A host robot, Starquester 2000, helps describe the accomplishments of the space probes, the critical role they play in space exploration, and the preparations they made for humans possibly to follow. The Hubble Space Telescope, Viking explorer and Cassini spacecraft "speak" for themselves with varied personalities in a fun but accurate presentation.

Perhaps the most thrilling part of the exhibit offers a view of how data from the robotic probes might be used to build a human habitat for Mars. It includes a display for visitors to witness a simulated Martian sunset.

"While the presentation is light and entertaining, and should have special appeal to young people, the message is serious and inspiring," Ball said.

Probes also play a significant role in the new film Quest for Life, shown in a new 300-seat theater. The film thoughtfully considers whether there's life beyond our planet. In addition to dramatic computer-generated visuals and live-action scenes, the latest scientific findings on how life might have emerged on as many as two billion other planets are presented. "Deep Space Nine" star Avery Brooks narrates the film.

"This film not only describes ways in which we have and are attempting to answer the question about whether life exists elsewhere, it provides a vision of the future, with human explorers on Mars and a robotic probe beneath the icy surface of Europa," Ball said.

An abundance of life certainly exists at Merritt Island Wildlife Refuge, the subject of the third new exhibit, which is free to all visitors. The walk-through adventure shows how NASA and nature exist and thrive side-by-side at KSC. Included are simulations of various habitats at the refuge, including the continental shelf, beach, grasslands, salt marshes and lagoon. Displays describe native species, including loggerhead turtles, alligators, manatees, black mice and indigo snakes.

The Visitor Complex - visited by more than 2.75 million guest annually - is NASA's official public gateway to KSC. Operated by Delaware North Parks Services of Spaceport Inc., the Visitor Complex features bus tours of the space center with up-close views of Space Shuttle launch facilities and International Space Station processing. IMAX films depict adventures in space on five-story screens. Educational exhibits feature historic flight hardware and tell NASA's story of human space flight, past, present and future.

NOTE TO EDITORS: Media interested in attending the opening ceremonies should arrive at the Visitor Complex no later than 9:45 a.m. on Friday, April 9, and check-in at the media station in the new entry plaza.

Go to the *KSC Press Releases* Home Page

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

May 12, 1999
KSC Contact: George H. Diller
KSC Release No. 26-99

Note to Editors/News Directors:
TERRIERS SPACECRAFT TO BE LAUNCHED MAY 17 ON PEGASUS XL

The TERRIERS satellite, part of NASA's Student Explorer Demonstration Initiative, is scheduled for launch aboard an Orbital Sciences Pegasus XL rocket on Monday, May 17 (PDT). The drop of the Pegasus from an L-1011 aircraft will occur at a location over the Pacific Ocean 150 miles northwest from the coast of Vandenberg Air Force Base, CA. The launch window extends from 10:05:47 - 10:14:26 p.m. PDT. The drop of the Pegasus from the L-1011 aircraft is targeted to occur at 10:10 p.m. PDT.

TERRIERS stands for Tomographic Experiment using Radiative Recombinative Ionospheric EUV and Radio Sources. The spacecraft has been developed by Boston University with a funding grant from NASA.

TERRIERS is designed to study the ionosphere. This highly ionized area, beginning at an altitude of about 30 miles and extending to about 250 miles, is one of the least understood parts of Earth's atmosphere. Understanding this area is becoming increasingly crucial as it is becoming home to many scientific spacecraft and commercial communications satellites. Radio signals including AM, FM, and short wave radio signals reflect off this region. The Space Shuttle, International Space Station and other scientific spacecraft orbit in this area.

PRELAUNCH NEWS CONFERENCE

The prelaunch news conference is scheduled to occur on L-1 day, Sunday, May 16, at 12 noon PDT in the conference room of the NASA-KSC Resident Office at Vandenberg Air Force Base. The news conference will be carried on an audio-only basis using the "V" circuits.

Participating in the prelaunch news conference will be:

- Supriya Chakrabarti, TERRIERS Chief Scientist
  Center for Space Physics, Boston University
- Chuck Dovale, NASA Launch Manager
  Kennedy Space Center, FL
- Bob Richards, Vice President, Commercial Programs
  Orbital Sciences Corporation

- Tim Cook, TERRIERS Project Manager
  Boston University, MA

- Andrew Stephan, TERRIERS Instrumentation Scientist
  Boston University, MA

- Captain Eric Barela, Launch Weather Officer
  USAF 30th Weather Squadron, Vandenberg Air Force Base, CA

Media desiring to cover the prelaunch news conference should meet at the south gate of Vandenberg Air Force Base on California State Road 246 at 11:45 a.m. on Sunday, May 16 for escort to the NASA-KSC Vandenberg Resident Office.

ACCREDITATION

Media desiring accreditation information should contact the Air Force by Friday, May 14 at:

Public Affairs Office
Vandenberg Air Force Base
Telephone: 805/606-3595
FAX: 805/734-8232, Ext. 6-8303
E-mail: cherryj@vafb3.vafb.af.mil (or) knowlest@vafb3.vafb.af.mil

LAUNCH DAY PRESS COVERAGE

On launch day, Monday, May 17, media representatives should meet at the Vandenberg main gate at 8:15 p.m. to be escorted to the runway for the takeoff of the L-1011, scheduled to occur at 9 p.m. After departure, media will be taken to the viewing room of the NASA Mission Director's Center located at Building 840 on South Vandenberg Air Force Base. From there, media may follow the launch of Pegasus/TERRIERS.

Assuming a nominal flight of the Pegasus launch vehicle, a formal post-launch news conference will not be held. However, launch vehicle and spacecraft representatives will be available afterward to answer media questions.

"V CIRCUIT" COVERAGE OF PEGASUS/TERRIERS

The prelaunch news conference will be held at 12 noon PDT on Sunday, May 16 and carried on the "V" audio circuits which may be dialed at Area Code (407) 867-1220, 867-1240, 867-1260, 867- 4003, 867-7135, and 867- 4920. The prelaunch news conference will not be carried on NASA Television.

Launch coverage will carried on the V circuits (audio monitoring only) beginning with departure of the L-1011 aircraft at 9 p.m. PDT, and will conclude after the TERRIERS spacecraft separates from the Pegasus approximately 10 minutes after launch.

The launch will not be carried on NASA Television.

PEGASUS/TERRIERS NEWS CENTER

The Pegasus/TERRIERS News Center at the NASA-KSC Vandenberg Resident Office will be staffed starting Sunday, May 16 and may be reached between 8 a.m.

and 4:30 p.m. PDT at 805/605-3051. A recorded status report will also be available and may be reached by dialing 805/734-2693.

For automatic e-mail subscriptions to this daily Shuttle status report or KSC-originated press releases, send an Internet electronic mail message to domo@news.ksc.nasa.gov. In the body of the message (not the subject line) type the words "subscribe shuttle-status", or "subscribe ksc-press-release" (do not use quotation marks). The system will reply with a confirmation via e-mail of each subscription.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

April 15, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 27-99

KSC, CONSORTIUM SIGN AGREEMENT TO STUDY ADVANCED METHODS FOR CLEANUP OF CONTAMINATED GROUNDWATER

Kennedy Space Center and a consortium of other federal agencies are leading the way to develop faster, more economic clean-up methods for numerous contaminated groundwater sites across the country, including an area at Launch Complex 34, Cape Canaveral Air Station.

KSC Director Roy Bridges, Commander of the U.S. Air Force 45th Space Wing General Randall R. Starbuck, and representatives of other participating federal environmental agencies signed a Memorandum of Agreement (MOA) earlier this month formalizing their cooperative efforts to test three innovative solutions in combating groundwater contamination at Launch Complex 34.

The complex is the site of several historic launches as well as the fatal Apollo 1 mission fire. Groundwater at the site became polluted in the1960s because the chemical trichloroethylene was directly discharged into the ground before its toxicity was completely understood. Trichloroethylene was used to clean rocket engine parts.

"All of us represented here today," said Bridges at the signing on April 6, "share the same groundwater clean-up goals, and therefore we also share the associated challenge of remediating one of the more tenacious subsurface contaminates, trichloroethylene, at LC-34."

Trichloroethylene is one of a number of dense non-aqueous phase liquids (DNAPLs) used in industrial procedures that have contaminated groundwater in thousands of sites across the country. The contaminant liquids pose a major long-term threat to drinking water due to their toxicity. The effort to share expertise among agencies in side-by-side comparisons will provide valuable performance and cost data that will result in cost savings efforts to clean-up contaminated sites throughout the country.

"As a kid I believed that NASA embodied the advancement of science in its exploration of space. Now it seems NASA is turning its considerable technical expertise in another direction, 40 or 50 feet down," said Timothy Oppelt, director of the National Risk Management Research Laboratory at the U.S. Environmental Protection Agency, at the signing ceremony.

Cleaning contaminated groundwater areas has traditionally been a matter of "pump and treat," but that can take years and years of effort, leading to huge financial outlays. Proven innovative technologies can provide up to about 60 percent savings in costs, Oppelt said.

However, those technologies can only be applied in specific situations, thus the need for testing.

Three 50-by-75 foot test cells have been set up beside the engineering support building at LC-34. Testing of two of the innovative decontamination technologies will begin this summer and testing of the third this fall. The treatments allow for decontamination without removal of the soils. Final results of the study are expected late next year.

Updates on the progress of the study will be posted at the consortium website at www.getf.org/dnaplguest.

In addition to Bridges, Starbuck and Oppelt, other representatives who participated in the MOA signing ceremony were Tom Heenan, assistant manager of environmental management, Savannah River Site, U.S. Department of Energy; Col. James Heald, Vice Commander, Air Force Research Laboratory, U.S. Air Force; Gerald Boyd, acting deputy assistant secretary, Office of Science and Technology, U.S. Department of Energy; James Fiore, acting deputy assistant secretary, Office of Environmental Restoration, Department of Energy; and Walter Kovalick Jr., Ph.D., director, Technology Innovation Office, U.S. Environmental Protection Agency.

Go to the *KSC Press Releases* Home Page

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

April 20, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 28-99

DAUGHTER'S DAY SCHEDULED FOR KSC EMPLOYEES APRIL 22

Just months before launch of the first shuttle mission to be commanded by a woman, Kennedy Space Center will host hundreds of girls reaching for their own stars.

On April 22, KSC will participate in the annual "Take Our Daughters To Work Day," a nation-wide celebration designed to inspire and motivate young women. This is KSC's 7th year celebrating this event. The theme for this year is "The Future is Me," stressing to young women the importance of setting goals and building self-esteem.

Special programs and presentations are planned all day, kicking off at 8 a.m. in the IMAX II Theater. Former NASA employee Andrea Shae-King, who now has her own company and writes for Florida Today, will be the guest speaker.

Other featured events will include science and robotics demonstrations, an Audubon Society bird of prey demonstration, and security and fire prevention displays. Participants will be able to spend the rest of the day in the sponsors' work areas observing work environment activities.

Daughters who are nine to 15 years of age are eligible to participate and will receive special badges for entrance into KSC. Children will be under constant escort by a parent or other family member acting as sponsor. Due to safety requirements, certain operational areas will be off-limits to visitors.

A "Take Our Sons to Work Day" is currently planned for June 8.

NOTE TO EDITORS: News media representatives wishing to cover the event should contact the KSC News Center to coordinate photo opportunity times.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

April 20, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 29-99

"MIRACLE BOY" WILL VISIT KSC TO FULFILL HIS DREAM

From a hospital in a war-torn community of Northern Ireland, a young boy dreamed of visiting KSC and meeting a real astronaut. This week that dream will come true, thanks to cooperative efforts of the White House, NASA, and the Share a Dream Foundation of Ireland.

Stephen Coyle, 9, suffered severe injuries and was placed on a life support machine after he and his family were caught in the explosion of a car bomb in Omagh, a city in Northern Ireland.

"Doctors gave Stephen very little time to live," wrote his mother in a letter to the Share a Dream Foundation. "He survived unbelievable odds and was called 'The Miracle Boy' by all the hospital staff."

When President Bill Clinton met Stephen in the Belfast hospital on his trip to Ireland last year, he promised Stephen on national television that when he got better, his dream of touring the Kennedy Space Center and meeting a real astronaut would come true.

Stephen will meet astronauts Rick Linnehan and David Brown at the KSC Visitor Complex at 9:30 on April 22. Then he will be treated to a VIP tour of the Center, including the Orbiter Processing Facility, the Vehicle Assembly Building, Launch Pad 39B, the Apollo/Saturn V Center, and the International Space Station Center. Stephen will be accompanied by his mother and father, who were also injured in the blast, and Shay Kinsella, founder and director of the Share a Dream Foundation.

Stephen continues to be treated for internal injuries, and he is slowly improving both physically and mentally.

"[This visit] would play a major part in the healing process we all need so much, and where there was so much darkness and despair, you can give us sunshine and hope if you can make this dream come true" wrote Coyle's mother.

Note To Editors: Media interested in meeting Stephen Coyle and his family should gather in the IMAX Theater conference room (ground floor between the theaters) at the KSC Visitor Complex at 9 a.m., Thursday, April 22.

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system will reply with a confirmation via e-mail of each subscription.

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NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

April 21, 1999
KSC Contact: George H. Diller
KSC Release No. 30-99

NASA AWARDS LAUNCH CONTRACT FOR ATHENA ROCKET

NASA announced today a contract award to Lockheed Martin Astronautics, Denver, CO, to launch the Vegetation Canopy Lidar (VCL) satellite on an Athena I rocket. Launch is scheduled for August 2000 from a launch pad located on Kodiak Island, AK. This will be the first launch to low Earth orbit from the Alaska Aerospace Development Corporation's new commercial launch facility.

The VCL satellite is designed to precisely measure the Earth's vegetation coverage, vegetation depth (or canopy) and topography by using short laser pulses from a LIDAR (Light Detection and Ranging) system. The Athena I rocket will place the satellite into a 261 mile-high orbit above the Earth inclined 67 degrees to the equator. The VCL spacecraft weighs 954 pounds and is 6.8 feet tall by 3.8 feet wide.

NASA has launched two other missions on Athena rockets: the Lewis satellite from Vandenberg Air Force Base, CA, on Aug. 22, 1997, using an Athena I; and the Lunar Prospector spacecraft from Cape Canaveral, FL, on Jan. 6, 1998, using an Athena II. NASA had previously planned to launch the Clark satellite on an Athena I but discontinued the program. However, the agency retained its contractual rights to the three-stage Athena I that will now be used for VCL.

The VCL mission is being implemented for NASA's Goddard Space Flight Center, Greenbelt, MD, by the University of Maryland, College Park, in support of the Earth System Science Pathfinder (ESSP) Program. The single-science instrument on VCL, the Multi-Beam Laser Altimeter (MBLA), is being built by Goddard's Laboratory for Terrestrial Physics. The spacecraft bus for VCL is being built by Orbital Sciences, Dulles, VA.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

April 22, 1999
KSC Contact: Joel Wells
KSC Release No. 31-99

Note to Editors:
NASA TO SHOWCASE SHUTTLE'S NEW "GLASS COCKPIT" AND OTHER ENHANCEMENTS

NASA's Space Shuttle fleet soars toward the 21st century with a host of enhancements that make today's Shuttle safer, more capable and less expensive to fly than ever before. Outfitted with the new Multifunction Electronic Display System (MEDS) or "glass cockpit," Shuttle Atlantis is the most modern orbiter in the fleet.

While preparing Atlantis for a December flight, managers will grant a rare peek inside the cockpit to a limited number of media on April 29. The day will begin with a briefing from Shuttle Upgrades managers and continue with additional media opportunities near other improved Shuttle related hardware like the Shuttle main engines, Super Lightweight Tank, Integrated Vehicle Health Management System and the Checkout and Launch Control System.

During Shuttle Atlantis' last major overhaul, scores of outdated electromechanical cockpit displays like cathode ray tube screens, gauges, and instruments gave way to 11 full-color flat panel screens. Not only does the new system improve crew/orbiter interaction with the easy-to-read, graphic portrayals of key flight indicators like attitude-display and Mach-speed, but it also reduces the high cost of maintaining obsolete systems. MEDS also provides greater backup capability, weighs less and uses less power than the original design.

Shuttle managers removed orbiter Atlantis from flight operations for 10 months as part of a regularly scheduled Orbiter Maintenance Down Period. Atlantis arrived at Boeing's orbiter processing facility in Palmdale, CA, on Nov. 14, 1997, and returned to KSC Sept. 27, 1998 with more than 130 major modifications including enhancements for International Space Station support. Atlantis was made 1,000 pounds lighter than before to increase cargo capacity.

In recent years, upgrades to the Shuttle fleet's main engines have more than quadrupled estimates of their safety and reliability. Weight reductions ranging from lighter astronaut seats to the Super Lightweight Tank have coupled with better performance to increase the Shuttle's cargo capacity by more than 8 tons. Across the fleet, NASA has implemented thousands of major and minor enhancements to the Shuttle's design and decreased the cost of operating the Shuttle by 40 percent during the last seven years.

NASA continues to implement improvements as new technologies like the Integrated Vehicle Health Management System (IVHM) and the Checkout and Launch Control

System (CLCS) are developed. IVHM monitors a Shuttle's health while on orbit through a network of hi-tech sensors placed throughout the orbiter. Managers currently depend on a labor intensive process of downloading flight data from Shuttle recorders after landing. Conducting Shuttle checkups with IVHM during a flight gives KSC managers a headstart on upcoming work and leads to quicker turnarounds.

CLCS will replace the dated Launch Processing System currently in use at KSC. CLCS promises modern, commercial off-the-shelf computer systems that will reduce operations and maintenance costs by 50 percent while testing the orbiter in its hangar, monitoring it at the launch pad and controlling the launch countdown.

With Atlantis powered up in the Orbiter Processing Facility, a limited number of reporters will have a brief opportunity to interview Shuttle Commanders, Jim Halsell or Ken Cockrell inside the new glass cockpit. In December, Halsell will command Atlantis' first flight with the new system, a mission to the International Space Station to outfit the station's living quarters. Cockrell will command Atlantis' next flight, another station assembly mission that will attach the U.S. research laboratory Destiny in early 2000.

Shuttle Pilot, Scott Horowitz will be available for interview at the KSC Press Site in front of a full-color display of the Glass Cockpit. Also, Shuttle managers will be available for interview near other improved Shuttle related hardware such as the Shuttle Main Engines, Super Lightweight Tank and the Checkout and Launch Control System.

-- end of general release --

Media should report to the KSC Press Site at 9 a.m. on April 29 to participate in the following scheduled activities:

9 - 9:30 a.m.: Shuttle Improvements Briefing with Shuttle managers

-Elric McHenry, Shuttle Program Development Manager
-Rich Jackson, Assistant, Shuttle Program Manager's Office
-Hugo Delgado, KSC Chief Engineer Shuttle Upgrades
-Andy Allen, United Space Alliance Director Shuttle Development

10:30 a.m. - 1:30 p.m.: Media interviews with Astronaut and/or Shuttle managers

Atlantis Glass Cockpit - Ken Cockrell, STS-98 Shuttle Commander inside Atlantis
Space Shuttle Main Engines (SSME) - Chris Singer, MSFC SSME Chief Engineer
Super Lightweight External Tank - Parker Counts, External Tank Project Manager
Integrated Vehicle Health Management system - Jack Fox, KSC IVHM Project Manager
Checkout Launch and Control System (CLCS) - Greg Clements, CLCS Engineer

1:30 - 4:30 p.m.: Media Interviews with Astronauts

Atlantis Glass Cockpit - Jim Halsell, STS-101 Shuttle Commander inside Atlantis
Press Site Glass Cockpit - Scott Horowitz, STS-101 Shuttle Pilot at Press Site

FINAL NOTE: Interested media should contact the KSC Press Site before 4:30 p.m. on Monday, April 26, for accreditation and to request a 5-10 minute appointment inside Atlantis. Appointments are limited and extras will be placed on a first-come-first-served waiting list. Other related media opportunities are available for those unable to gain orbiter access.

Reporters must wear long pants, close-toed shoes, and sleeved shirts. No jewelry or excessive make-up will be permitted inside the orbiter. A NASA videographer will be positioned inside the crew module and will record media interviews with beta tapes provided by the reporter. Photographers will be permitted inside the OPF and can shoot reporters entering and leaving the orbiter.

For automatic e-mail subscriptions to this daily Shuttle status report or KSC-originated press releases, send an Internet electronic mail message to domo@news.ksc.nasa.gov. In the body of the message (not the subject line) type the words "subscribe shuttle-status", or "subscribe ksc-press-release" (do not use quotation marks). The system will reply with a confirmation via e-mail of each subscription.

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NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

April 23, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 32-99

Note to Editors:
MEDIA OPPORTUNITY WITH STS-96 CREW SET FOR NEXT WEEK'S TCDT

The crew of Space Shuttle mission STS-96 will be at Kennedy Space Center next week for the Terminal Countdown Demonstration Test (TCDT).

In preparation for this and other activities required prior to launch, Shuttle Discovery today was rolled out of the Vehicle Assembly Building (VAB) to Launch Pad 39B. First motion from the VAB occurred at about 7 a.m.

The TCDT is held at KSC prior to each Space Shuttle flight, providing the crew of each mission an opportunity to participate in simulated countdown activities. The TCDT ends with a mock launch countdown culminating in a simulated main engine cut-off. The crew also spends time undergoing emergency egress training exercises at the pad and has an opportunity to view and inspect the payloads in the orbiter's payload bay.

The seven-member crew of mission STS-96 is scheduled to arrive at KSC's Shuttle Landing Facility (SLF) at about 5:30 p.m. Monday, April 26. Media interested in viewing the crew arrival should be at the KSC Press Site by 4:30 p.m. for transport to the SLF.

On Wednesday, April 28, news media representatives will have an opportunity to speak informally with and photograph the crew at Pad 39B. Media interested in participating in this question and answer session should be at the KSC Press Site by 12:30 p.m. Wednesday for transport to the pad. This question and answer session will be a local media event only, however, it will be carried live on NASA TV.

On Thursday, the entire crew will take part in simulated launch day events. At the pad, the crew will enter the orbiter Discovery fully suited for the simulated Shuttle main engine ignition and cut-off. Following TCDT, the crew is scheduled to depart KSC for their homes in Houston for final flight preparations.

Discovery is targeted for launch on May 20 at about 9:32 a.m. EST. Mission STS-96 is scheduled to last about 10 days. Discovery will visit the orbiting International Space Station on a logistical supply mission.

Crew members for mission STS-96 are: Commander Kent Rominger; Pilot Rick Husband; Mission Specialists Ellen Ochoa, Tamara Jernigan, Dan Barry, Julie Payette of the Canadian Space Agency, and Valery Tokarev for the Russian Space Agency.

Internet electronic mail message to domo@news.ksc.nasa.gov. In the body of the message (not the subject line) type the words "subscribe shuttle-status", or "subscribe ksc-press-release" (do not use quotation marks). The system will reply with a confirmation via e-mail of each subscription.

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NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

May 5, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 33-99

LAUNCH DATE SET FOR SHUTTLE MISSION TO SPACE STATION

NASA managers today set May 20 as the launch date for Space Shuttle Discovery and an international crew on an inaugural visit to the orbiting International Space Station.

Discovery will spend six days linked to the new outpost on Shuttle mission STS-96 as the crew outfits Zarya and Unity. The Shuttle will carry more than two tons of supplies to be stored aboard the station, ranging from food and clothes for the first crew to laptop computers, a printer and cameras.

"We are about to begin one of the most versatile years ever for the Space Shuttle," Space Shuttle Program Manager Ron Dittemore said. "In the next seven months, we plan to do things that showcase almost all of the Shuttle's unique capabilities – assembly of the space station; launch, repair and maintain satellites; and map the Earth. The team has done a fantastic job preparing Discovery for this flight, and we're ready to get off to a great start."

Discovery's May 20 launch window opens at about 9:32 a.m. EDT and extends for approximately 10 minutes. On the day of launch, managers may adjust the launch time within that window to optimize the Shuttle's performance.

Discovery's crew, led by U.S. Navy Commander Kent Rominger, reflects the global nature of the station with three of five international partners represented. Included are cosmonaut Valery Tokarev, a colonel in the Russian Air Force, and Canadian Space Agency astronaut Julie Payette, who will become the first Canadian to board the station. U.S. Air Force Lt. Col. Rick Husband, will serve as pilot, and a space walk will be performed by astronauts Tammy Jernigan, Ph.D., and Dr. Daniel Barry. Jernigan and Barry will attach a U. S.-built "space walkers' crane" and parts of a Russian-built crane to the exterior for use on future missions. Astronaut Ellen Ochoa rounds out the crew as flight engineer and operator of the Shuttle's mechanical arm.

Discovery's mission will set the stage for the launch this fall of the Russian-provided Service Module, the first station living quarters, and the arrival in early 2000 of the first three-person station crew.

STS-96
Discovery
Mission to a New Star on the Horizon

KSC Release No. 34-99
May 1999

The Space Shuttle Discovery's international crew of seven will become the first visitors to a new star in orbit on mission STS-96.

Discovery's 10-day journey is the first flight to the International Space Station planned for 1999. This mission prepares the station for the arrival of its early living quarters -- the Russian-built Service Module, scheduled to be launched on a Russian rocket later this year -- and for the first station crew, scheduled to occupy the Station early next year.

Discovery will spend six days linked to the station, during which the crew will deliver and install supplies that could not be launched aboard the station's two initial modules because of weight limitations. In addition to external items attached during a space walk, the crew will deliver approximately 5,000 pounds of internal cargo -- ranging from laptop computers, cameras and a printer to maintenance tools, spare parts and clothing -- through a corridor to the interior of the station.

Other scheduled tasks include installing battery chargers and a noise muffler in Zarya, the Russian-built segment of the station, and making a photographic record of the station's key elements. The highlight of the flight will be a space walk by mission specialists Tamara E. Jernigan and Daniel T. Barry, scheduled for the fourth day of flight.

The astronauts' space walk will attach a U.S.-developed "crane" to the exterior of the station, as well as parts of a Russian-built crane. During the space walk, Mission Specialist Ellen Ochoa will operate the Shuttle's mechanical arm to maneuver Jernigan into position. Jernigan will use a foot platform attached to the end of the arm.

Discovery's cargo bay will be outfitted with versatile carriers in order to accommodate the mission's wide variety of payloads. The mission will employ the SPACEHAB double module, a pressurized container that can carry cargo both internally and externally. The module complements the orbiter middeck with a cargo capacity of up to 10,000 pounds and also contains systems necessary to support a habitat for the astronauts.

The orbiter's cargo bay also will house the Integrated Cargo Carrier, a structure designed to haul payloads that do not require a pressurized environment. The Carrier will transport three crucial items: the SPACEHAB Oceaneering Space System Box, a logistics carrier that can handle loads of up to 400 pounds; a U.S.-built crane called the Orbital Replacement Unit Transfer Device; and the Russian-made cargo crane known as Strela.

When complete in the year 2004, the International Space Station will comprise more than 100 elements with a total weight of more than one million pounds. It will allow humankind to harness as never before one of the fundamental forces of nature – gravity -- to perform research that may result in new medicines, materials and industries on Earth.

The station's scientific studies, performed in six state-of-the-art laboratories, may even lead to a new understanding of the fundamental laws of nature while they pave the way for the future human exploration of space. The project, which unites the resources and scientific expertise of 16 nations, is the largest scientific cooperative program in history. A total of 45 missions involving the Space Shuttle and two types of Russian rockets will assemble the station.

The 94th Space Shuttle launch and the 26th flight of Discovery will begin with liftoff from Launch Pad 39B. Discovery will ascend at a 51.6-degree inclination to the equator for direct insertion to a 199-statute-mile (173 nautical- mile/320-kilometer) orbit.

Landing is planned at Kennedy Space Center's Shuttle Landing Facility.

The Crew

The seven-member flight crew will be commanded by Kent V. Rominger (Cdr., USN), a veteran flier with more than 1,090 hours in space. He carries a master of science degree in aeronautical engineering from the U.S. Naval Postgraduate School. During 12 years as a Naval aviator, he surpassed 5,000 flying hours in more than 35 types of aircraft and made 685 carrier landings. He completed an aviation deployment in Operation Desert Storm before being selected in 1992 for the astronaut program. He has flown three times as a Shuttle pilot, most recently on STS-85 in 1997.

Rick D. Husband (Lt. Col., USAF) fills the role of pilot on his first space flight. During 15 years as an Air Force officer, he accumulated over 3,800 hours of flight time in more than 40 different types of aircraft. That service included an assignment as an exchange test pilot with the Royal Air Force in Boscombe Down, England. He was selected as an astronaut candidate by NASA in December 1994.

Mission specialists Tamara Jernigan and Daniel T. Barry, a pair of veteran space fliers, are assigned the task of fastening elements to the station during an Extravehicular Activity, or space walk. Barry, who is making his second Shuttle flight, took part in a space walk of more than six hours on STS-72 in 1996. He has separate doctorates in electrical engineering/computer science and medicine.

Jernigan is the crew's most experienced flier, with more than 1,277 hours in space to her credit. She will make her fifth Shuttle flight, having flown most recently on STS-80 in 1996. The possessor of a doctorate degree in space physics and astronomy from Rice University, she served as a research scientist in the Theoretical Studies Branch at NASA Ames Research Center before entering the 1985 NASA astronaut class. Before being assigned to STS-96, she served as Assistant for Station to the Chief of the Astronaut Office, directing crew involvement in the development and operation of the station.

Mission Specialist Ellen Ochoa embarks on her third Shuttle flight, having served as payload commander on a previous mission. She joined the astronaut program in 1990. Ochoa, who has a doctorate in electrical engineering from Stanford, is a co-inventor on three patents for an optical inspection system, an optical object recognition method and a method for noise removal in images. She has served a variety of roles for NASA, including one as a spacecraft communicator in Mission Control.

The International Space Station remains true to its name with the presence of the final two mission specialists. Julie Payette makes her first trip into space after being selected as an astronaut by the Canadian Space Agency in 1992. The owner of a military instrument rating in the Canadian Air Force, she has logged more than 600 hours of flight time, including 150 hours on the Tutor CT-114 jet aircraft. She has worked as a technical advisor for the Mobile Servicing System, the Canadian contribution to the International Space Station. In preparation for a space assignment, she studied Russian and accumulated more than 120 hours of flight time in reduced gravity.

Valery Ivanovich Tokarev, a colonel in the Russian Air Force, is making his first space flight. He has participated in the testing of 44 types of aircraft in his native country. He joined the Russian cosmonaut corps in 1987. Since 1997, he has served as a test cosmonaut for the Gagarin Cosmonaut Training Center in Star City, Russia.

STS-96 Experiments

STARSHINE

In addition to the orbiter's primary cargo, Discovery will carry components of the Student Tracked Atmospheric Research Satellite for Heuristic International Networking Experiment (STARSHINE). The payload features a mirrored sphere, 19 inches in diameter, covered with more than 800 reflective pieces of polished aluminum.

Technology students in Utah machined the pieces, which were then shipped by project officials to schools in the U.S. as well as Argentina, Austria, Australia, Belgium, Canada, China, Denmark, England, Finland, Japan, Mexico, New

Zealand, Pakistan, South Africa, Spain, Turkey and Zimbabwe. Teams of elementary, middle and high school students polished the pieces to make them suitably reflective.

Once deployed from the orbiter's cargo bay, the STARSHINE sphere will be visible without instrumentation for months at dusk and dawn. Volunteer teams of students will track the satellite's progress visually, using the resulting observations to make deductions about the effects of aerodynamic drag. If the experiment is deemed successful, it may be repeated on future Shuttle flights.

Shuttle Vibrations

Another payload on STS-96 is the Shuttle Vibration Forces Experiment, an update of an experiment used on a previous mission. The payload consists of sensors attached to the mounting brackets holding the cargo in place. The sensors will activate automatically upon liftoff and continue to record for about 100 seconds, measuring the vibrations exchanged between the orbiter and its cargoes during that interval.

Other payloads

A second set of sensors and avionics equipment mounted in the payload bay, the Integrated Vehicle Health Monitoring System, will record the performance of various onboard systems. The results could produce changes in the design of the system, leading to improved efficiency in orbiter processing and enhanced safety on future Shuttle missions.

A final test aboard Discovery will explore the use of new equipment, called the Volatile Removal Assembly, that may one day be used for recycling water aboard the International Space Station.

Go to the *KSC Fact Sheets* home page

Go to the *KSC Press Releases* home page

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

May 20, 1999
KSC Contact: Joel Wells
KSC Release No. 35-99

AIRSPACE, BRIDGES AND WATERWAY RESTRICTIONS IN EFFECT FOR ALL SPACE SHUTTLE LAUNCHES

Violators of Kennedy Space Center's restricted airspace caused a delay during the final minutes of the STS-95 launch countdown last year. With the STS-96 launch of Space Shuttle Discovery only days away, NASA managers urge all aircraft pilots and boaters to comply fully with the airspace, bridges and waterway restrictions imposed around KSC during all Shuttle launches and landings.

"The STS-96 launch window is only 5 to 10 minutes, so it is crucial that the Shuttle launch team not be delayed with costly distractions like airspace violators," said KSC Launch Director Ralph Roe. "As always, we are coordinating with officials from the Eastern Range and Federal Aviation Administration (FAA) to help provide a safe launch environment for the Shuttle crew and for interested spectators. Violating these restrictions is not only unsafe for the astronauts, it's unsafe for the violator."

Space Shuttle Discovery's first launch opportunity is on May 27 at about 6:48 a.m. At NASA's request, FAA surveillance aircraft will patrol KSC's airspace boundaries on launch day. Violators will be intercepted by patrol forces, thoroughly investigated and will be subject to FAA enforcement action.

A number of restrictions are placed in effect around the Kennedy Space Center (KSC) during the hours immediately preceding and following the launch of a Space Shuttle.

Listed and described below are restrictions that apply to pilots, motor vehicle operators and boaters utilizing airspace, bridges and waterways that lead to KSC.

KSC AREA AVIATION RESTRICTIONS

The airspace immediately above and around KSC will be limited to official aircraft only and will be off-limits to general aviation pilots prior to and during the launch of a Space Shuttle.

NOTAMS must be checked by pilots prior to flights near the KSC area. Pilots are warned that a violation of KSC's restricted airspace may likely result in serious penalties, including the suspension or revocation of pilot privileges.

Official aircraft supporting the launch will be in the air. Private pilots must be aware that wandering into a restricted area is not only forbidden, but that it also creates a

safety hazard to support aircraft and the errant pilot.

Anyone wishing to view the launch from the air below 11,000 feet should stay west of the Indian River. Above 11,000 feet, pilots should stay west of the St. Johns River. Pilots are advised that the airspace in the KSC vicinity is expected to be congested with both controlled and uncontrolled aircraft.

Pilots should also be aware of the Solid Rocket Booster (SRB) exhaust cloud that occurs after launch. They should stay at least five miles away from the cloud, even if it drifts out of the restricted area.

Generally, the airspace restrictions cover a variety of air ranges. In addition to the usual KSC and Cape Canaveral Air Station airspace restrictions, the upcoming launch requires that all private aircraft stay out of an area roughly bounded by the west side of the Indian River to the west, the Trident Basin (Port Canaveral) to the south, 10 miles north of Haulover Canal at the Oak Hill, FL city limit and a minimum of 50 miles seaward to the east. These restrictions are "surface to unlimited." Launch-specific restrictions begin three hours prior to the planned launch time.

Pilots should consult the most recent editions of the Jacksonville Sectional Aeronautical Chart and the Airman's Information Manual. In addition, they should contact the St. Petersburg Flight Service Station at 1-800-992-7433. (1-800-WX-BRIEF). Advisories will be available from the Patrick Approach Control (VHF 134.95 megahertz), Space Center Executive Airport Tower (VHF 118.9 megahertz) or the NASA Tower (128.55 megahertz).

Pilots should also refer to the current Patrick Air Force Base news release concerning restricted airspace.

BRIDGES CONTROLLED FOR LAUNCH

The opening and closing of bridges over waterways surrounding KSC will be strictly controlled during the hours immediately before and after the launch period for each Space Shuttle mission.

Bridges affected by the launch include:

- Canaveral Harbor Barge Canal (SR 401, south of Cape Canaveral Air Station's Gate 1);
- Indian River Causeway West or NASA Causeway (Intracoastal Waterway at Addison Point);
- Merritt Island Barge Canal (Merritt Island State Road 3);
- Haulover Canal Bridge (State Road 3, north of KSC).

Restraints on bridge openings for boat traffic begin three hours before launch. The bridges may be opened for five minutes at the following points in the launch countdown: T-180 minutes, T-150 minutes, T-120 minutes, T-90 minutes, and T-65 minutes. Adding 20 minutes to these times and subtracting that amount from the launch time will result in an approximate time of openings.

Bridges will remain closed to boat traffic until 90 minutes after lift-off (T+90). They

may then open for five minutes at T+90, T+120 minutes and T+150 minutes. Bridge operations will return to normal three hours (T+180 minutes) after launch.

Should the Shuttle be required to perform a Return-to-Launch-Site (RTLS) landing at KSC, all bridges would remain closed to boat traffic from 45 minutes before landing until at least one hour after landing.

KSC AREA BOATING RESTRICTIONS

Waterways and boating near the Kennedy Space Center will be strictly controlled prior to and during the launch of the Space Shuttle.

Safety and security requirements, including U.S. Air Force range safety impact limit lines, will go into effect as early as three days before launch. Other requirements will be phased into effect through sunset the night before launch. A general description of the area follows:

BANANA RIVER: Security limits begin at the Banana River Barge Canal south of KSC at the State Road 528 crossing and extend north. This restriction is effective roughly 12 hours prior to launch.

ATLANTIC OCEAN: Beginning the day before launch, a general exclusion zone will be in effect three miles offshore from the Haulover Canal, near the north end of KSC, and southward to Port Canaveral. Four hours prior to launch, all ocean-going traffic will be restricted from entering an area measured from five miles north and south of the launch pad and extending 30 miles east into the ocean. Pad 39A is located at latitude 28 degrees, 36 minutes, 29.7014 seconds north; longitude 80 degrees, 36 minutes, 15.4166 seconds west. Pad 39B is located at latitude 28 degrees, 37 minutes, 26 seconds north; longitude 80 degrees, 37 minutes, 15.09 seconds west. An additional three-mile-wide exclusion zone will be extended eastward along the projected flight path of the Space Shuttle.

MOSQUITO LAGOON: This area south of the Haulover Canal is off limits to all boats beginning the day before launch.

INDIAN RIVER: Restrictions apply from the NASA Causeway north to the Haulover Canal and east of the Indian River's main channel. Restrictions begin the day before launch.

All boating restrictions will be lifted approximately one hour after launch.

The U.S. Coast Guard, the U.S. Fish and Wildlife Service, and KSC security forces share responsibility for enforcing the boating guidelines.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

May 14, 1999
KSC Contact: George H. Diller
KSC Release No. 36-99

Launch Advisory:
LAUNCH DATES FOR UPCOMING NASA SPACECRAFT ON EXPENDABLE VEHICLES BECOME UNCERTAIN

Due to the recent anomalies involving expendable vehicles not associated with NASA launches, there is a schedule impact on the near-term NASA manifest. NASA is a participant in the failure investigations and is reviewing the readiness of its missions based on an understanding of the failures and the proposed corrective actions. With the exception of the Pegasus/TERRIERS launch at Vandenberg Air Force Base, CA, scheduled for next week, other launch dates are uncertain.

Following is a list of upcoming NASA flights with their earliest possible launch timeframes.

The launch of TERRIERS for Boston University on a Pegasus rocket from Vandenberg Air Force Base is confirmed for Monday, May 17, during a launch window that extends from 10:05:47 – 10:14:26 p.m. PDT. The drop from the L-1011 aircraft is targeted to occur at 10:10 p.m. PDT.

The launch of GOES-L for NASA and NOAA aboard an Atlas IIA rocket from Pad 36-A at Cape Canaveral will occur no earlier than late May following launch of STS-96.

The launch of FUSE for NASA and Johns Hopkins University from Pad 17-A at Cape Canaveral will occur no earlier than June 18. This could change to a later date during June.

The launch of QuickScat for NASA and the Jet Propulsion Laboratory aboard a Titan II rocket from SLC-4W at Vandenberg Air Force Base will occur no earlier than mid-June.

Except for TERRIERS, these dates should be considered for planning purposes until firm dates can be scheduled.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

May 14, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 37-99

KSC SHUTTLE LAUNCH DIRECTOR ROE ACCEPTS NEW POSITION AT JSC

Ralph Roe, Jr., NASA Space Shuttle launch director at Kennedy Space Center, is moving to Houston, TX, and into a new position as manager of the Space Shuttle Vehicle Engineering Office at Johnson Space Center.

In this position, Roe will direct the design, production and testing of Space Shuttle orbiters, associated government-furnished equipment, the remote manipulator system, software, avionics and flight crew equipment.

Roe will make the transition after the launch of STS-96, scheduled for no earlier than May 27 from KSC. Roe served as launch director for Space Shuttle Missions STS-95 and STS-88.

"It has been an honor to be a member of the KSC team, and this is a great opportunity for me to share the operational experience I've gained at KSC with the rest of the Shuttle program," said Roe.

Roe joined NASA at KSC in 1983 and has served in several senior technical and managerial positions. Formerly, he served as the Director, Process Engineering Directorate; Chief, Fluid Systems Division; and Chief, Environmental Control, Hypergolic and Hydraulic Systems Branch in the Vehicle Directorate at KSC.

Roe earned a bachelor of science degree in mechanical engineering from the University of South Carolina in 1983 and a master of science degree in engineering management from the University of Central Florida in 1992.

A successor launch director has yet to be named.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

May 17, 1999
KSC Contact: George H. Diller
KSC Release No. 38-99

CANADIAN SPACE STATION ROBOTIC ARM ARRIVES AT KSC

The Canadian Space Agency's first contribution to the International Space Station (ISS), the 56-foot-long Space Station Remote Manipulator System (SSRMS), has begun its campaign toward launch with an arrival at the Kennedy Space Center on Sunday, May 16.

The SSRMS is in three segments which when fully assembled is comprised of two booms, each with two 12-foot sections, joined by a hinge. There are two Latching End Effectors (LEE) for grappling, one effector mounted on each end of the arm. Seven joints are associated with the arm which allow for highly flexible and precise movement. Four video cameras with lights, two of which have a pan/tilt capability, will be mounted on each of the booms and on the two end effectors. These cameras will permit the astronauts maximum visibility for operations and maintenance tasks on the ISS. The SSRMS is also the primary means of transferring payloads between the orbiter payload bay and the station for assembly.

Next month, the SSRMS will undergo a functional test in the Space Station Processing Facility. Later, the arm will be electrically connected to Destiny, the U.S. Laboratory, for the Multi-Element Integrated Test. This will verify the SSRMS robotic work station controls aboard Destiny that the astronauts will use to control the arm.

Next, the segments of the arm will be attached to a launch support assembly structure. During this process the three elements and the two end effectors are mated together. This places the arm into its final flight configuration. Finally, the arm will be mated to the payload carrier and a launch configuration test will be performed. This will be an integrated electrical test with the elements of the arm fully assembled and connected.

The SSRMS was built in Canada by Macdonald Dettwiler Space and Advanced Robotics, Ltd., of Brampton, Onatrio (formerly SPAR). It is scheduled to be launched aboard Space Shuttle Endeavour on STS-100 currently planned for July 2000.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

May 20, 1999
KSC Contact: George H. Diller
KSC Release No. 39-99

SPACE SHUTTLE WEATHER LAUNCH COMMIT CRITERIA AND KSC END OF MISSION WEATHER LANDING CRITERIA

The launch weather guidelines involving the Space Shuttle and expendable rockets are similar in many areas, but a distinction is made for the individual characteristics of each. The criteria are broadly conservative and assure avoidance of possibly adverse conditions. They are reviewed for each launch.

For the Space Shuttle, weather "outlooks" provided by the U. S. Air Force Range Weather Operations Facility at Cape Canaveral begin at Launch minus 5 days in coordination with the NOAA National Weather Service Spaceflight Meteorology Group (SMG) at the Johnson Space Center in Houston. These include weather trends and their possible effects on launch day. A formal prelaunch weather briefing is held on Launch minus 1 day which is a specific weather briefing for all areas of Space Shuttle launch operations.

Launch weather forecasts, ground operations forecasts, and launch weather briefings for the Mission Management Team and the Space Shuttle Launch Director are prepared by the Range Weather Operations Facility. Forecasts which apply after launch are prepared by SMG. These include all emergency landing forecasts and the end of mission forecasts briefed by SMG to the astronauts, the Flight Director and Mission Management Team.

During the countdown, formal weather briefings occur approximately as follows:

L-24 hr 0 min: Briefing for Flight Director and astronauts
L-21 hr 0 min: Briefing for removal of Rotating Service Structure
L-9 hr 00 min: Briefing for external tank fuel loading
L-4 hr 30 min: Briefing for Space Shuttle Launch Director
L-3 hr 55 min: Briefing for astronauts
L-2 hr 10 min: Briefing for Flight Director
L-0 hr 35 min: Briefing for launch and RTLS
L-0 hr 13 min: Poll all weather constraints

The basic weather launch commit criteria on the pad at liftoff must be:

Temperature: Prior to external tank propellant loading, tanking will not begin if the 24 hour average temperature has been below 41 degrees.

After tanking begins, the countdown shall not be continued nor the Shuttle launched if:

a.) the temperature exceeds 99 degrees for more than 30 consecutive minutes.

b.) the temperature is lower than the prescribed minimum value for longer than 30 minutes unless sun angle, wind, temperature and relative humidity conditions permit recovery. The minimum temperature limit in degrees

F. is specified by the table below and is a function of the five minute average of temperature, wind and humidity. The table becomes applicable when the observed temperature reaches 48 degrees. In no case may the Space Shuttle be launched if the temperature is 35 degrees or colder.

Wind Speed	**Relative Humidity**				
(kts)	0-64%	65-74%	75-79%	80-89%	90-100%
0 - 1	48	47	46	45	44
2	47	46	45	44	43
3	41	41	41	40	39
4	39	39	39	39	38
5 - 7	38	38	38	38	38
8 - 14	37	37	37	37	37
>14	36	36	36	36	36

The above table can be used to determine when conditions are again acceptable for launch if parameters have been out of limits for thirty minutes or less. If longer than thirty minutes, a mathematical recovery formula of the environmental conditions is used to determine if a return to acceptable parameters has been achieved. Launch conditions have been reached if the formula reaches a positive value.

Wind: Tanking will not begin if the wind is observed or forecast to exceed 42 knots for the next three hour period.

For launch the wind constraints at the launch pad will vary slightly for each mission. The peak wind speed allowable is 30 knots. However, when the wind direction is between 100 degrees and 260 degrees, the peak speed varies for each mission and may be as low as 24 knots.

The upper atmosphere wind profile must conform to either one of two wind loading programs developed by the Johnson Space Center. This profile is determined by a series of Jimsphere wind balloon releases from Cape Canaveral Air Station. A final recommendation is made by the JSC Launch Systems Evaluation Advisory Team (LSEAT) to the KSC launch director at Launch minus 30 minutes. The Space Shuttle will not be launched within 30 minutes of the time a determination has been made that the upper wind profile will adversely affect the performance of the launch vehicle.

A downrange weather advisory shall be issued by the Shuttle Weather Officer to the Mission Management Team for their consideration if the wind in the solid rocket booster recovery area is forecast to exceed 26 knots during retrieval operations. Seas in excess of Sea State 5 (8-13 feet) may also be a factor considered by the Mission Management Team.

Precipitation: None at the launch pad or within the flight path.

Lightning (and electric fields with triggering potential):

- Tanking will not begin if there is forecast to be greater than a 20% chance of lightning within five nautical miles of the launch pad during the first hour of tanking. The launch director with the concurrence of the safety director may make an exception after consultation with the Shuttle Weather Officer.
- Do not launch if lightning has been detected within 10 nautical miles of the pad or the planned flight path within 30 minutes prior to launch. Launch may occur if the source of lightning has moved more than 10 nautical miles away from the pad or the flight path and a field mill, used to measure electric fields, is located within 5 nautical miles of the lightning flash.

The one-minute average of the electric field mill network may not exceed -1 or +1 kilovolt per meter within five nautical miles of the launch pad or the lightning flash at any time within 15 minutes prior to launch. This field mill criteria becomes -1.5 or + 1.5 kilovolts per meter if there are no clouds within 10 nautical miles of the flight path except those which are transparent. Also excepted are clouds with tops below the 41 degrees F. temperature level that have not have been previously associated with a thunderstorm, or associated with convective clouds having tops above the 14 degrees F. temperature level during the last three hours.

- Do not launch when lightning is observed and the cloud which produced the lightning is within 10 nautical miles of the flight path. Launch may not occur until 30 minutes has elapsed since the lightning flash, or the cloud has moved more than 10 nautical miles away.

Clouds: (types known to contain hazardous electric fields)

- Do not launch if any part of the planned flight path is through a layer of clouds any part of which is within 5 nautical miles is 4,500 feet thick or greater and the temperature of any part of the layer is between 32 degrees F. and -4 degrees F. Launch may occur if the cloud layer is a cirrus-like cloud that has never been associated with convective clouds, is located entirely at temperatures of 5 degrees F. or colder, and shows no evidence of containing water droplets.

- Do not launch through cumulus type clouds with tops higher than the 41 degree F. temperature level. Launch may occur through clouds as cold as 23 degrees F. if the cloud is not producing precipitation, and all field mills within 5 nautical miles of the flight path and at least one field mill within 2 nautical miles of the cloud center read between -100 volts per meter and +500 volts per meter.

- Do not launch 1.) through or within 5 nautical miles of the nearest edge of cumulus type clouds with tops higher than the 14 degree F level; 2) through or within 10 nautical miles of the nearest edge of cumulus clouds with tops higher than the -4 degrees F. level.

- Do not launch if the flight path is through any non-transparent clouds that extend to altitudes at or above the 32 degrees F. level which are associated with disturbed weather producing moderate or greater precipitation, or melting precipitation, within five nautical miles of the flight path.

- Do not launch through an attached anvil cloud. If lightning occurs in the anvil or the associated main cloud, do not launch within 10 nautical miles for the first 30 minutes after lightning is observed, or within 5 nautical miles from 30 minutes to 3 hours after lightning is observed.

- Do not launch if the flight path will carry the vehicle:

  a.) through non-transparent parts of a detached anvil for the first three hours after the anvil detaches from the parent cloud, or the first four hours after the last lightning occurs in the detached anvil.

  b.) within 10 nautical miles of non-transparent parts of a detached anvil for the first thirty minutes after the time of the last lightning in the parent or anvil cloud before detachment, or the detached anvil after its detachment.

  c.) within 5 nautical miles of non-transparent parts of a detached anvil for the first three hours after the time of the last lightning in the parent or anvil cloud before detachment, or the detached anvil after detachment, unless there is a field mill within 5 nautical miles of the detached anvil reading less than 1,000 volts per meter for the last 15 minutes and a maximum radar returns from any part of the detached anvil within 5 nautical miles of the flight path have been less than 10 dBZ (light rain) for 15 minutes.

- Do not launch if the flight path will carry the vehicle through a thunderstorm or cumulonimbus debris cloud which is not transparent and less than three hours old. Launch may not occur within five nautical miles of these debris clouds unless: 1) for 15 minutes preceding launch there is at least one working field

mill within five nautical miles of the debris cloud; 2) all electric field mill readings are between -1 kilovolt and + 1 kilovolt per meter within five nautical miles of the flight path; 3) no precipitation has been detected in the debris cloud (less than 10 dbz by radar) within 5 nautical miles of the flight path.

- Do not launch if the flight path will carry the vehicle through any cumulus cloud that has developed from a smoke plume while the cloud is attached to the plume, or for the first 60 minutes after the cumulus cloud detaches from the smoke plume.

Supporting Table: KSC Seasonal Altitudes of Temperature Levels in thousands of feet

January				July			
Temp	**Low**	**Avg**	**High**	**Temp**	**Low**	**Avg**	**High**
-4 F	21 Kft	24 Kft	26 Kft	-4 F	23 Kft	27 Kft	29 Kft
14	13	18	21	14	18	21	23
23	9	15	18	23	16	18	20
32	sfc	12	16	32	13	15	18
41	sfc	9	14	41	10	12	15

Range Safety Cloud Ceiling and Visibility constraints:

- Direct visual observation of the Shuttle is required through 8,000 feet. This requirement may be satisfied using optical tracking sites or a forward observer

- For cloud ceilings of any thickness between 6,000 feet and 8,000 feet the following conditions must be met for launch to occur:

  a.) the vehicle integrity can be observed without interruption through 6,000 feet.

  b.) all required Range Safety instrumentation is functioning properly

  c.) the U.S. Air Force 45th Space Wing Commander approves the decision to proceed

- For cloud ceilings between 4,000 feet and 6,000 feet the following conditions must be met for launch to proceed:

  a.) the thickness of the clouds must be less than 500 feet

  b.) the vehicle integrity can be monitored by the Eastern Range airborne and/or the ground forward observers through 8,000 feet

  c.) all required Range Safety instrumentation is functioning properly

  d.) the U.S. Air Force 45th Space Wing Commander approves the decision to proceed

A "Good Sense Rule" is in effect for launch which states: "Even when constraints are not violated, if any other hazardous conditions exist, the launch weather officer will report the threat to the launch director. The launch director may hold at any time based on the instability of the weather."

CONTINGENCY FLIGHT RULES

Weather criteria for an emergency landing must be considered along with launch criteria since the possibility exists for a Return To Launch Site abort (RTLS), landings at the Trans-Oceanic Abort Landing Sites (TAL), the Abort Once Around (AOA) sites and the first day Primary Landing Site (PLS). These forecasts are prepared by

the NOAA National Weather Service Spaceflight Meteorology Group in Houston and briefed by them to the astronauts, Flight Director and Mission Management Team. All criteria refer to observed and forecast weather conditions except for the first day PLS which is forecast weather only.

- For RTLS with redundant Microwave Landing System (MLS) capability and a weather reconnaissance aircraft, cloud coverage 4/8 or less below 5,000 feet and a visibility of 4 statute miles or greater are required. For AOA and PLS sites, cloud coverage 4/8 or less below 8,000 feet and a visibility of 5 statute miles or greater is required. For TAL sites, cloud coverage 4/8 or less below 5,000 feet and a visibility of 5 statute miles or greater are required.

- For landing on a hard surface runway without redundant Microwave Landing System (MLS) capability all sites require a ceiling not less than 10,000 feet and a visibility of at least 7 statute miles. Landing at night on a lake bed runway may occur if the ceiling is not lower than 15,000 feet and the visibility is 7 miles or greater with at least non-redundant MLS capability .

- For the RTLS site and TAL sites, no thunderstorms, lightning, or precipitation within 20 nautical miles of the runway, or within 10 nautical miles of the final approach path extending outward to 30 nautical miles from the end of the runway.

- An RTLS rule exception may be made for light precipitation within 20 nautical miles of the runway if the specific criteria listed below are met:

  a.) The tops of the clouds containing precipitation do not extend into temperature regions colder than 41 (F.); they have not been colder than 14 (F.) within 2.5 hours prior to launch; the radar reflectivity is less than 30 dbz at all levels within and below the clouds.

  b.) Precipitation covers less than 10% of the area within 20 nautical miles of the runway, or multiple heading alignment circles are clear of showers.

  c.) The movement of the showers is observed to be consistent and no additional convective development is forecast.

  d.) Touchdown/rollout criteria and associated navigational aids meet the specified prelaunch go/no go requirements.

If showers exceed either parameter of part a.) above, an RTLS landing may still occur if a 2 nautical mile vertical clearance can be maintained from the top of any shower within 10 nautical miles of the approach paths.

- For RTLS and TAL sites, no detached opaque thunderstorm anvils less than three hours old within 15 nautical miles of the runway, or within 5 nautical miles of the final approach path extending outward to 30 nautical miles from the end of the runway.

- For AOA and PLS sites, no thunderstorms, lightning or precipitation within 30 nautical miles of the runway, or within 20 nautical miles of the final approach path extending to 30 nautical miles from the end of the runway.

- For RTLS and the TAL sites, no detached opaque thunderstorm anvil cloud less than 3 hours old within 15 nautical miles of the runway or within 5 nautical miles of the final approach path extending outward to 30 nautical miles from the end of the runway.

- For AOA and PLS sites, no detached opaque thunderstorm anvil cloud less than 3 hours old within 20 nautical miles of the runway or within 10 nautical miles of the final approach path extending to 30 nautical miles from the end of the runway.

- The RTLS crosswind component may not exceed 15 knots. If the astronaut flying weather reconnaissance

in the Shuttle Training Aircraft executes the approach and considers the landing conditions to be acceptable, this limit may be increased to 17 knots. For the TAL, AOA and PLS sites there is a night-time crosswind limit of 12 knots.

- **Headwind:** not to exceed 25 knots.
- **Tailwind:** not to exceed 10 knots average, 15 knots peak.
- **Turbulence:** conditions must be less than or equal to moderate intensity.

KSC END OF MISSION LANDING WEATHER FLIGHT RULES

The end of mission landing weather forecast is prepared by the NOAA National Weather Service Spaceflight Meteorology Group in Houston for the astronauts, Flight Director and Mission Management Team. All criteria refer to observed and forecast weather conditions. Decision time for the deorbit burn is 70 - 90 minutes before landing. The weather criteria are:

- Cloud coverage of 4/8 or less below 8,000 feet and a visibility of 5 miles or greater required.
- The peak cross wind cannot exceed 15 knots, 12 knots at night. If the mission duration is greater than 20 days the limit is 12 knots, day and night.
- Headwind cannot exceed 25 knots.
- Tailwind cannot exceed 10 knots average, 15 knots peak.
- No thunderstorm, lightning, or precipitation activity is within 30 nautical miles of the Shuttle Landing Facility.
- Detached opaque thunderstorm anvils less than three hours old must not be within 20 nautical miles of the Shuttle Landing Facility, or within 10 nautical miles of the flight path when the orbiter is within 30 nautical miles of the runway.
- Turbulence must be less than or equal to moderate intensity.
- Consideration may be given for landing with a "no go" observation and a "go" forecast if at decision time analysis clearly indicates a continuing trend of improving weather conditions, and the forecast states that all weather criteria will be met at landing time.

WEATHER INSTRUMENTATION

The weather equipment used by the forecasters to develop the launch and landing forecasts is:

- **Radar:** Launch forecasters located at Cape Canaveral Air Station and landing forecasters located in Houston can access displays from two different radar. One is located at Patrick Air Force Base south of Cocoa Beach. The other is located in Melbourne at the National Weather Service and is a NEXRAD Doppler radar. Each radar provides rain intensity and cloud top information out to a distance as far as 200 nautical miles. The NEXRAD radar can also provide estimates of total rainfall and radial wind velocities.
- **Field Mill Network:** Thirty-one advanced field mill sites around KSC and Cape Canaveral Air Station provide data on lightning activity and surface electric fields induced by charge aloft. This data helps forecasters determine when electric charge aloft may be sufficient to create triggered lightning during launch, and to determine when to issue and cancel lightning advisories and warnings.
- **Lightning Detection System:** Detects and plots cloud to ground lightning strikes within 125 nautical miles of the Kennedy Space Center. Location accuracy is optimum within 30 nautical miles. Locations of

strikes are color coded according to time of occurrence.

- **Lightning Detection And Ranging (LDAR):** Developed by NASA at the Kennedy Space Center, LDAR plots intracloud, cloud to cloud and cloud to ground lightning in three dimensions within 100 nautical miles of the Kennedy Space Center. Location accuracy is very high within 25 nautical miles. LDAR data is important in determining the beginning and end of lightning conditions.

- **National Lightning Detection Network:** Plots cloud to ground lightning nationwide. Used to help ensure safe transit of the Space Shuttle orbiter atop the Shuttle Carrier Aircraft between Edwards Air Force Base in California and the Kennedy Space Center in Florida. It is also used to assess lightning beyond the 125 mile range of the Lightning Detection System.

- **Rawinsonde:** A balloon with a tethered instrument package which radios its altitude to the ground together with temperature, dewpoint and humidity, wind speed and direction, and pressure data. Rawinsondes reach altitudes exceeding 100,000 feet.

- **Jimsphere balloon:** A reflective balloon made of mylar tracked by radar which provides highly accurate information on wind speed and wind direction up to 60,000 feet.

- **Doppler Radar Wind Profiler:** Measures upper level wind speed and direction over Kennedy Space Center from approximately 10,000 feet to 60,000 feet. The data, received every 5 minutes, is used to ensure the upper winds used to calculate wind loads on the shuttle vehicle have not significantly changed between balloon soundings. If data from the Doppler Radar Wind Profiler indicates a possible significant change, another Jimsphere balloon is released.

- **Rocketsonde:** A 12-foot-tall instrumented rocket is launched on L-1 day which senses and transmits data on temperature, wind speed and direction, wind shear, pressure, and air density at altitudes between 65,000 feet and 370,000 feet. A four-inch in diameter solid rocket motor separates at an altitude of about 5,000 feet, after which an "instrumented dart" coasts to apogee.

- **Satellite Images and Data:** Provided directly to the satellite terminal at USAF Range Weather Operations and NOAA National Weather Service Space Flight Meteorology Group in Houston by the geostationary GOES weather satellites. In addition high resolution images are received from spacecraft in low earth orbit including both the NOAA and the Defense Meteorological Support Program (DMSP) polar orbiting satellites.

- **Meteorological Interactive Data Display System (MIDDS):** Integrates diverse weather data on a single display terminal-- satellite images, radar, computer generated graphics of surface and upper air map features, numerical weather models, current weather observations, data from meteorological towers, lightning strikes and field mill information.

- **Towers:** 33 meteorological towers are located on Kennedy Space Center and Cape Canaveral Air Station, including two at each launch pad and three at the Shuttle Landing Facility. In addition to wind, most towers are also instrumented with temperature, and moisture sensors. The 60-foot towers at the launch pads and the 33-foot towers at the Shuttle Landing Facility are closely monitored for launch and landing criteria. In addition, on the mainland, there is a network of 19 wind towers which extend outward an additional twenty miles. Tower data is an important short-term forecasting tool and also helps determine the direction and distance of toxic corridors in the event of a mishap.

- **Buoys:** Meteorological buoys are anchored 20, 110 and 160 nautical miles east-northeast of Cape Canaveral. These buoys relay hourly measurements via satellite of temperature, wind speed and direction, barometric pressure, precipitation, sea water temperature, and wave height and period. Buoy data is used for launch, landing, booster retrieval, and daily ground processing forecasts for the Kennedy Space Center and Cape Canaveral Air Station.

- **Solid Rocket Booster Retrieval Ships:** These vessels radio observed weather conditions and sea state from the booster impact area located up to 150 nautical miles downrange.
- **Weather Reconnaissance Aircraft:** A T-38 jet and the Shuttle Training Aircraft are flown by a weather support astronaut.

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NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

May 25, 1999
KSC Contact: Joel Wells
KSC Release No. 40-99, Rev. A

LAUNCH COUNTDOWN FOR STS-96 SET TO BEGIN MAY 24

NASA will begin the countdown for launch of Space Shuttle Discovery on mission STS-96 on May 24, at 9 a.m. EDT at the T-43 hour mark. The KSC launch team will conduct the countdown from Firing Room 1 of the Launch Control Center.

The countdown includes 26 hours and 44 minutes of built-in hold time leading to a preferred launch time of about 6:48 a.m. on May 27. The launch window opens at 6:44 a.m. and extends for about 9 minutes. The exact launch time will be determined during the final hold at T-9 minutes in the countdown, based on the orbital position of the International Space Station.

This will be the first Space Shuttle mission of the year. Mission STS-96 marks the 26th flight of the orbiter Discovery and the 94th flight overall in NASA's Space Shuttle program. STS-96 is slated to last 9 days, 20 hours, 37 minutes. Discovery returns to KSC's Shuttle Landing Facility at 3:25 a.m. on June 6.

Discovery will haul about 4,000 pounds of supplies and equipment up to the International Space Station (ISS). After executing the first Shuttle/ISS docking on flight day 3, astronauts will transfer laptop computers, cameras, maintenance tools and clothing from the SPACEHAB double module over to the ISS. Discovery's Integrated Cargo Carrier will house the SPACEHAB Oceaneering Space System Box, a U.S.-built crane called the Orbital Replacement Unit Transfer Device, and a Russian-made crane known as Strela. During this flight, space walking astronauts Tamara Jernigan and Daniel Barry will fasten parts of Strela to the station's exterior and stow the U.S. crane inside.

In addition to the primary payloads, Discovery will deploy a spherical, mirrored satellite called STARSHINE that students will observe and track for several months. New water recycling equipment will also be tested aboard the orbiter for future application on the ISS.

Discovery was rolled out of Kennedy Space Center's Orbiter Processing Facility bay 1 on April 15 and then mated with the external tank and solid rocket boosters in the Vehicle Assembly Building. The Shuttle stack was transported to pad 39B on April 23, but had to return to the VAB on May 16, so workers could repair the external tank's foam insulation. A local hail-storm inflicted more than 650 divots in the foam. Workers repaired at least 460 critical divots over four days to minimize possible ice formation prior to launch. Discovery returned to the pad on May 20.

The STS-96 crew consists of: Commander Kent Rominger, Pilot Rick Husband, Mission Specialists Tamara Jernigan, Ellen Ochoa, Daniel Barry, Canadian Julie Payette and Russian Valery Tokarev. The crew is scheduled to arrive at KSC at about 10:30 p.m., Sunday, May 23. Their activities at KSC prior to launch will include crew equipment fit checks, medical examinations and opportunities to fly in the Shuttle Training Aircraft.

COUNTDOWN MILESTONES
*all times are Eastern

Launch - 3 Days (Monday, May 24)

- Prepare for the start of the STS-96 launch countdown
- Perform the call-to-stations (8:30 a.m.)
- All members of the launch team report to their respective consoles in Firing Room 1 in the Launch Control Center for the start of the countdown
- Countdown begins at the T-43 hour mark (9 a.m.)
- Begin final vehicle and facility close-outs for launch
- Review flight software stored in mass memory units and display systems
- Load backup flight system software into Discovery's general purpose computers
- Inertial measurement unit checks (7:30 p.m.)
- Activate and test navigational systems (10 p.m.)

Launch - 2 Days (Tuesday, May 25)

- Preparations to load power reactant storage and distribution system complete (1 a.m.)

Enter first planned built-in hold at T-27 hours for duration of four hours (1 a.m.)

- Clear launch pad of all non-essential personnel
- Perform test of the vehicle's pyrotechnic initiator controllers (2 a.m.)
- Open launch pad to personnel supporting PRSD load

Resume countdown (5 a.m.)

- Begin operations to load cryogenic reactants into Discovery's fuel cell storage tanks (6:30 a.m. - 11:30 a.m.)

Enter four-hour built-in hold at T-19 hours (1 p.m.)

- External tank inspection
- Demate orbiter mid-body umbilical unit and retract into fixed service structure (1:30 p.m.)
- Resume orbiter and ground support equipment close-outs

Resume countdown (5 p.m.)

- Start final preparations of the Shuttle's main engines for propellant tanking and flight
- Begin Mission Specialist seat installation and cable routing verifications (7 p.m.)
- Close-out the tail service masts on the mobile launcher platform (12 midnight)

Launch - 1 Day (Wednesday, May 26)

Enter planned hold at T-11 hours for 13 hours, 54 minutes (1 a.m.)

- Begin startracker functional checks
- Activate orbiter's inertial measurement units (2:30 a.m.)
- Install film in numerous cameras on the launch pad (4 a.m.)
- Activate the orbiter's communications systems (5 a.m.)
- Flight crew equipment late stow begins (7:30 a.m.)
- Fill pad sound suppression system water tank
- Safety personnel conduct debris walk down
- Move Rotating Service Structure (RSS) to the park position (10 a.m.)
- Perform orbiter ascent switch list in crew cabin
- Start fuel cell flow-through purge (2 p.m)

Resume countdown (2:54 p.m.)

- Activate the orbiter's fuel cells (4:04 p.m.)
- Configure communications at Mission Control, Houston, for launch
- Clear the blast danger area of all non-essential personnel
- Switch Discovery's purge air to gaseous nitrogen (5:10 p.m.)
- Complete inertial measurement unit activation

Enter planned one-hour built-in hold at the T-6 hour mark (7:54 p.m.)

- Launch team verifies no violations of launch commit criteria prior to cryogenic loading of the external tank
- Clear pad of all personnel
- Chilldown of liquid propellant lines before external tank loading (9:30 p.m.)

Resume countdown (9:54 p.m.)

- Begin loading the external tank with about 500,000 gallons of cryogenic propellants (about 9:54 p.m.)
- Complete filling the external tank with its flight load of liquid hydrogen and liquid oxygen propellants (about 12:54 a.m.)

Launch Day (Thursday, May 27)

Enter planned two-hour built-in hold at T-3 hours (12:54 a.m.)

- Perform inertial measurement unit preflight calibration
- Align Merritt Island Launch Area (MILA) tracking antennas
- Close-out crew and Final Inspection Team proceed to Launch Pad 39B
- Launch Director weather briefing (5:14 a.m.)

Resume countdown at T-3 hours (2:54 a.m.)

- Perform open loop test with Eastern Range
- Crew departs Operations and Checkout Building for the pad (about 3 a.m.)
- Complete close-out preparations in the white room
- Check cockpit switch configurations
- Flight crew begins entry into the orbiter (about 3:30 a.m.)
- Astronauts perform air-to-ground voice checks with Launch Control and Mission Control

- Close Discovery's crew hatch (about 4:44 a.m.)
- Perform hatch seal and cabin leak checks
- Complete white room close-out
- Close-out crew moves to fallback area (about 5:34 a.m.)

Enter planned 10-minute hold at T-20 minutes (5:34 a.m.)

- NASA Test Director conducts final launch team briefings
- Complete inertial measurement unit pre-flight alignments

Resume countdown (5:44 a.m.)

- Transition the orbiter's onboard computers to launch configuration
- Start fuel cell thermal conditioning
- Close orbiter cabin vent valves
- Transition backup flight system to launch configuration

Enter planned 40-minute hold at T-9 minutes (5:55 a.m.)

- Launch Director, Mission Management Team and NASA Test Director conduct final polls for go/no go to launch

Resume countdown at T-9 minutes (6:35 a.m.)

- Start automatic ground launch sequencer (T-9:00 minutes)
- Retract orbiter crew access arm (T-7:30)
- Start mission recorders (T-6:15)
- Start Auxiliary Power Units (T-5:00)
- Arm SRB and ET range safety safe and arm devices (T-5:00)
- Start liquid oxygen drainback (T-4:55)
- Start orbiter aerosurface profile test (T-3:55)
- Start main engine gimbal profile test (T-3:30)
- Pressurize liquid oxygen tank (T-2:55)
- Begin retraction of the gaseous oxygen vent arm (T-2:55)
- Fuel cells to internal reactants (T-2:35)
- Pressurize liquid hydrogen tank (T-1:57)
- Deactivate SRB joint heaters (T-1:00)
- Orbiter transfers from ground to internal power (T-0:50 seconds)
- Ground Launch Sequencer go for auto sequence start (T-0:31 seconds)
- SRB gimbal profile (T-0:21 seconds)
- Ignition of three Space Shuttle main engines (T-0:6.6 seconds)
- SRB ignition and liftoff (T-0)

SUMMARY OF BUILT-IN HOLDS FOR STS-96			
T-TIME	**LENGTH OF HOLD**	**HOLD BEGINS**	**HOLD ENDS**
T-27 hours	4 hours	1 a.m. Tues.	5 a.m. Tues.
T-19 hours	4 hours	1 p.m. Tues.	5 p.m. Tues.
T-11 hours	13 hours, 54 minutes	1 a.m. Wed.	2:54 p.m. Wed.
T-6 hours	2 hours	7:54 p.m. Wed.	9:54 p.m. Wed.

T-3 hours	2 hours	12:54 a.m. Thurs.	2:54 a.m. Thurs.
T-20 minutes	10 minutes	5:34 a.m. Thurs.	5:44 a.m. Thurs.
T-9 minutes	40 minutes	5:55 a.m. Thurs.	6:35 a.m. Thurs.

CREW FOR MISSION STS-96	
POSITION	**NAME**
Commander (CDR)	Kent Rominger
Pilot (PLT)	Rick Husband
Mission Specialist (MS1)	Tamara Jernigan
Mission Specialist (MS2)	Ellen Ochoa
Mission Specialist (MS3)	Daniel Barry
Mission Specialist (MS4)	Julie Payette
Mission Specialist (MS5)	Valerie Tokarev

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NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

May 25, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 41-99, Rev. A

Notice to Editors/News Directors:
MISSION STS-96 EVENTS, NEWS CENTER OPERATING HOURS SET

News conferences, events and operating hours for KSC's News Center have been set for the May 27 launch of the Space Shuttle Discovery on Mission STS-96, the 94th launch in the Shuttle program. The conferences and events will be carried live on NASA Television unless otherwise noted.

The seven STS-96 crew members are scheduled to arrive at KSC Sunday, May 23, at about 10:30 p.m. EDT. News media representatives planning to cover the event must be at the News Center by 9:30 p.m. Sunday (in the event of a possible early crew arrival) for transportation to the Shuttle Landing Facility.

News media representatives with proper authorization may obtain STS-96 mission credentials at the Pass and Identification Building on State Road 3 (south of KSC) on Merritt Island during published times. (Credential and badging hours are listed below.)

In addition to daily 9 a.m. countdown status briefings, there will be an International Space Station program status press conference and a pre-launch press conference two days before launch.

-- end of general release --

STS-96 BRIEFING & EVENTS SCHEDULE *(all times are EST)*
(All briefings are held inside the KSC Press Site auditorium and will be carried live on NASA TV unless otherwise noted)

10:30 p.m. Sunday, May 23 ----- *STS-96 Flight Crew Arrival (Live on NASA TV)*

L-3 Days - Monday, May 24 (Launch countdown begins at 9 a.m.)

9 a.m. ----- *Countdown Status Briefing*

- Doug Lyons, NASA Test Director
- Felix Joe, STS-96 Payload Manager
- Ed Priselac, Shuttle Weather Officer

L-2 Days - Tuesday, May 25

9 a.m. ----- *Countdown Status Briefing*

- Steve Altemus, NASA Test Director
- Felix Joe, STS-96 Payload Manager
- Ed Priselac, Shuttle Weather Officer

12:30 p.m. *------ International Space Station Program Status Briefing*

- Frank Culbertson, ISS Deputy Program Manager for Operations
- Alain Debeau, Director, ISS Program, Canadian Space Agency
- Ian Pryke, Washington Representative, European Space Agency
- Masafumi Yamamoto, Deputy Director, NASDA, Houston
- Boris Ostroumov, Deputy Director General, Russian Space Agency

4 p.m. *----- Pre-launch News Conference*

- Ron Dittemore, Shuttle Program Manager, JSC
- Tommy Holloway, ISS Program Manager, JSC
- Dave King, Director of Shuttle Operations, NASA, Kennedy Space Center
- Captain Clif Stargardt, Staff Meteorologist, 45th Weather Squadron, USAF

L-1 Day - Wednesday, May 26

9 a.m. *----- Countdown Status Briefing*

- Steve Altemus, NASA Test Director
- Felix Joe, STS-96 Payload Manager
- Ed Priselac, Shuttle Weather Officer

10 a.m. *------ Starshine Briefing*

- Gil Moore, Director, Project Starshine
- William Daniels Green, Grenbrier County Schools, White Sulphur Springs, WV
- Benjamin Jerald Sullivan, Williamsburg Elementary, Williamsburg, WV
- Holly Shannon Glick, Frankford Elementary, Renick, WV
- David Oliver, Teacher, Bowral Primary School, Bowral, New South Wales, Australia
- Jonathon F. Smith, Student, Bowral Primary School, Bowral, New South Wales, Australia

Launch Day - Thursday, May 27
(Tanking begins at about 8:30 p.m. Wednesday)

1:30 a.m. *----- NASA Television live launch programming begins*

Launch Day Crew activities:
6:30 p.m. (Wednesday) ----- Crew wake up
7 p.m. (Wednesday) ----- Breakfast
11:30 p.m. (Wednesday) ----- Free time
**1:49 a.m. ----- Crew photo*
2:19 a.m. ----- Weather briefing
**2:40 a.m. ----- Suit up*
**2:59 a.m. ----- Walkout*
**3:29 a.m. ----- Arrive at pad*
**4:44 a.m. ----- Close hatch*
****6:44 a.m. ----- Launch of Discovery***

The exact time of launch will be determined at the T-9 minute hold
(carried live on NASA TV)*

Launch + 1 hour ***-----*** *Post-launch Press Conference*

- *Donald R. McMonagle, Manager, Launch Integration for the Space Shuttle Program*
- *Ralph Roe, KSC Launch Director*

KSC News Center office hours for STS-96
(Times may be adjusted in real time depending on mission events and timelines.)

Sunday, May 23 (Launch minus 4 days) ----- 8 p.m. - 12 midnight
Monday, May 24 (Launch minus 3 days) ----- 8 a.m. - 4:30 p.m.
Tuesday, May 25 (Launch minus 2 days) ----- 8 a.m. - 7 p.m.
Wednesday, May 26 (Launch minus 1 day) ----- 8 a.m. - round-the-clock
Thursday, May 27 (Launch Day) Flight day 1 ----- round-the-clock - 7 p.m.
Friday, May 28 - Flight day 2 ----- 8 a.m. - 4:30 p.m.
Saturday, May 29 - Flight day 3 ----- 1 - 3 a.m.
Sunday, May 30 - Flight day 4 ----- 4:30 - 6:30 a.m.
Monday, May 31 - Flight day 5 ----- 1 - 3 a.m. (Memorial Day)
Tuesday, June 1 - Flight day 6 ----- 6 a.m. - 4:30 p.m. and 11 p.m. - 1 a.m. (Wed.)
Wednesday, June 2 - Flight day 7 ----- 6 a.m. - 4:30 p.m.
Thursday, June 3 - Flight day 8 ----- 6 a.m. - 4:30 p.m. & 8 - 10 p.m.
Friday, June 4 - Flight day 9 ----- 8 a.m. - 4:30 p.m.
Saturday, June 5 - Flight day 10 ----- 6 a.m. - 12 noon
Sunday, June 6 (Landing day) Flight day 11 ----- TBD

News media may obtain STS-96 mission credentials at the Pass and Identification Building at Gate 2 on State Road 3, Merritt Island, during the following times:

Pass and Identification Hours

Sunday, May 23 --------- 8 - 9:30 p.m.
Monday, May 24 -------- 8 a.m. - noon
Tuesday, May 25 -------- 8 a.m. - 4:30 p.m.
Wednesday, May 26 ---- 8 a.m. - 6 p.m.
Thursday, May 27 ------- 2 a.m. - 5:30 a.m.

News media with annual Shuttle credentials are reminded to sign the logbook at the query counter in the News Center.

NEWS MEDIA ARE REQUIRED TO BE UNDER PUBLIC AFFAIRS ESCORT AT ALL TIMES WHILE AT KSC EXCEPT WHEN DRIVING TO THE NEWS CENTER OR THE COMPLEX 39 CAFETERIA.

NEWS MEDIA ARE ALLOWED AT THE PRESS SITE ONLY WHEN PUBLIC AFFAIRS PERSONNEL ARE ON DUTY AND THE NASA NEWS CENTER IS OPEN.

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NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

May 28, 1999
KSC Contact: Patti Phelps
KSC Release No. 42A-99

NASA HONORS KENNEDY SPACE CENTER EMPLOYEES

Kennedy Space Center (KSC) honored 51 of its civil service and contractor employees at a special Honoree Event held May 27 at the space center.

The KSC employees are among some 250 NASA and industry employees from around the country who were honored by top NASA and industry leaders for their significant contributions to the nation's space program.

The KSC employees attended a special reception in their honor, and were joined by astronauts and senior NASA and industry officials of the Space Shuttle and International Space Station team. They were given a VIP tour of Kennedy Space Center and participated in various briefings. They also watched the STS-96 launch of the Space Shuttle Discovery on Thursday, May 27, from a special VIP viewing site. STS-96 is the second Space Shuttle flight dedicated to the assembly of the International Space Station.

The Honoree Award is the highest form of recognition bestowed upon an employee by the NASA Space Flight Awareness Program. Recipients are selected for their professional dedication and outstanding achievement in support of the human spaceflight program.

Twelve civil service employees were honored. They are Robert J. Beil, Louise Y. Boyd, Gregory R. Clements, Roy Mitch Colvin II, Denise R. DeLaPascua, E. Ellen Dozier, Stephenie M. King, John T. Madura, Paul A. Mogan, Cary J. Peaden, Joan J. Robbins and Susan D. Sitko.

Boeing Space and Communications employees honored include Michael S. J. Cianciotto, Paul J. Cummins, Scott R. Cummins, Ray C. DeLaune, Eric E. Herrburger, Guy Kitchens, Robert G. Miller, Hubert R. Ridens, Sharon L. Tobert and James B. Werpy.

Other contractor Honorees were Barry J. Meneghelli of Dynacs Engineering Co., Inc.; Wendy J. Law and Lawrence W. Salberg of Space Gateway Support; and Claudia L. Dorn, Weldon R. Dupriest; William J. Sokol of Wyle Laboratories, Inc.; George D. Davis of Allied Signal, Inc.; and Donald M. Beary, Trina L. Bridges, Carol L. Cabot, Michael A. Carpenter, Evelyn E. Garcia, Douglas O. Keuneke, Michael A. Lanum, Kem McLemore and Stacy L. Shoemaker of United Technologies, USBI Co.

United Space Alliance employees honored were Russell X. Brucker, Ronald A.

Butler, Mary J. Curnutte, Cris E. Curtis, Georgia A. Durham, Stephen A. Friend, Joe R. Fuqua, Daniel J. Gompers, Donald W. Hedman, Beckey M. Henn, Steven P. Lloyd, Michael D. Parker and Tommy G. Shinholster.

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NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

May 28, 1999
KSC Contact: Patti Phelps
KSC Release No. 42B-99

ROBERT J. BEIL HONORED FOR ROLE IN SPACE PROGRAM

Robert J. Beil, a native of Norfolk, VA, and a current resident of Merritt Island, FL, was among 51 Kennedy Space Center (KSC) employees who were honored recently for their exemplary work at the nation's spaceport.

Beil graduated in 1982 from Bayside High School in Virginia Beach, VA. He is the son of James Beil and Patricia Beil of Norfolk.

Beil received a bachelor degree in mechanical engineering from Old Dominion University in 1986, and a master's from the University of Central Florida in Orlando in 1993.

At KSC, Beil is employed by NASA as a lead engineer for the main propulsion system. He joined the space center in 1987 and has been honored with a KSC Certificate of Commendation and a Fluid System Division employee of the month award.

He and his wife, Elizabeth Reyer Beil, have one son, Kyle Alexander Beil, age 2.

The Honoree Award is the highest form of recognition bestowed upon an employee by the NASA Space Flight Awareness Program. The 51 employees selected were part of a contingent of some 250 NASA and contractor employees from throughout the space agency being honored for their professional dedication and outstanding achievement in support of the human space flight program.

The Honorees were given a VIP tour of Kennedy Space Center and attended a special reception. Honoring them were several astronauts and senior officials from NASA and the space industry. The Honorees also were taken to a special VIP viewing area to watch the STS-96 launch of the Space Shuttle Discovery on May 27.

Kennedy Space Center is the launch site and preferred landing site for NASA's Space Shuttles. STS-96 is the second shuttle flight dedicated to the assembly of the International Space Station.

Go to the *KSC Press Releases* Home Page

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

May 28, 1999
KSC Contact: Patti Phelps
KSC Release No. 42C-99

ROBERT J. BEIL HONORED FOR ROLE IN SPACE PROGRAM

Robert J. Beil, a graduate of Old Dominion University, was among 51 Kennedy Space Center (KSC) employees who were honored recently for their exemplary work at the nation's spaceport.

A native of Norfolk, VA, and a current resident of Merritt Island, FL, Beil graduated in 1982 from Bayside High School in Virginia Beach, VA. He is the son of James Beil and Patricia Beil of Norfolk.

Beil received a bachelor degree in mechanical engineering from Old Dominion University in 1986, and a master's from the University of Central Florida in Orlando in 1993.

At KSC, Beil is employed by NASA as a lead engineer for the main propulsion system. He joined the space center in 1987 and has been honored with a KSC Certificate of Commendation and a Fluid System Division employee of the month award.

He and his wife, Elizabeth Reyer Beil, have one son, Kyle Alexander Beil, age 2.

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NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

May 28, 1999
KSC Contact: Patti Phelps
KSC Release No. 42D-99

ROBERT J. BEIL HONORED FOR ROLE IN SPACE PROGRAM

Robert J. Beil, a graduate of the University of Central Florida, was among 51 Kennedy Space Center (KSC) employees who were honored recently for their exemplary work at the nation's spaceport.

Beil received a bachelor degree in mechanical engineering from Old Dominion University in 1986, and a master's from the University of Central Florida in Orlando in 1993. A native of Norfolk, VA, he graduated in 1982 from Bayside High School in Virginia Beach, VA. He now lives in Merritt Island, FL. He is the son of James Beil and Patricia Beil of Norfolk.

At KSC, Beil is employed by NASA as a lead engineer for the main propulsion system. He joined the space center in 1987 and has been honored with a KSC Certificate of Commendation and a Fluid System Division employee of the month award.

He and his wife, Elizabeth Reyer Beil, have one son, Kyle Alexander Beil, age 2.

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NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

May 28, 1999
KSC Contact: Patti Phelps
KSC Release No. 42E-99

LOUISE Y. BOYD HONORED FOR ROLE IN SPACE PROGRAM

Louise Y. Boyd, a native and current resident of Sanford, FL, was among 51 Kennedy Space Center (KSC) employees who were honored recently for their exemplary work at the nation's spaceport.

Boyd graduated in 1977 from Seminole High School. She is the daughter of the late Charles C. Boyd and Louise L. Boyd of Sanford.

Boyd received a bachelor degree in mathematics from the University of Florida in 1981, and a master's from Webster University in 1999.

At KSC, Boyd is employed by NASA as a workforce program manager in the management planning office. She joined the space center in 1982 and received a NASA Exceptional Service Medal in 1998.

She was listed as one of "30 Leaders of the Future" by Ebony Magazine in 1989.

The Honoree Award is the highest form of recognition bestowed upon an employee by the NASA Space Flight Awareness Program. The 51 employees selected were part of a contingent of some 250 NASA and contractor employees from throughout the space agency being honored for their professional dedication and outstanding achievement in support of the human space flight program.

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NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

May 28, 1999
KSC Contact: Patti Phelps
KSC Release No. 42F-99

STEPHENIE MORGAN-KING HONORED FOR ROLE IN SPACE PROGRAM

Stephenie Morgan-King, a native of Los Angeles, and a current resident of Merritt Island, FL, was among 51 Kennedy Space Center (KSC) employees who were honored recently for their exemplary work at the nation's spaceport.

She is the daughter of Jimmie Fukuzaki of Los Angeles and Masae Tezuka of San Diego.

Morgan-King received a degree of certification from the Brevard Law Enforcement Academy in Melbourne, FL, in 1983.

At KSC, Morgan-King is employed by NASA as an occupational safety and health specialist. He/she joined the space center in 1973 and has received three Sustained Superior Performance awards.

She has a daughter, Tamara Morgan of Merritt Island, FL, and a son, Ronaldo Morgan of Orlando.

The Honoree Award is the highest form of recognition bestowed upon an employee by the NASA Space Flight Awareness Program. The 51 employees selected were part of a contingent of some 250 NASA and contractor employees from throughout the space agency being honored for their professional dedication and outstanding achievement in support of the human space flight program.

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NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

May 28, 1999
KSC Contact: Patti Phelps
KSC Release No. 42G-99

STEPHENIE MORGAN-KING HONORED FOR ROLE IN SPACE PROGRAM

Stephenie Morgan-King, a native of Los Angeles, CA, and a current resident of Merritt Island, FL, was among 51 Kennedy Space Center (KSC) employees who were honored recently for their exemplary work at the nation's spaceport.

She is the daughter of Jimmie Fukuzaki of Los Angeles and Masae Tezuka of San Diego.

Morgan-King received a degree of certification from the Brevard Law Enforcement Academy in Melbourne, FL, in 1983.

At KSC, Morgan-King is employed by NASA as an occupational safety and health specialist. He/she joined the space center in 1973 and has received three Sustained Superior Performance awards.

She has a daughter, Tamara Morgan of Merritt Island, FL, and a son, Ronaldo Morgan of Orlando.

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NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

May 28, 1999
KSC Contact: Patti Phelps
KSC Release No. 42h-99

JOHN T. MADURA HONORED FOR ROLE IN SPACE PROGRAM

John Madura, a graduate of Loyola-Marymount University, was among 51 Kennedy Space Center (KSC) employees who were honored recently for their exemplary work at the nation's spaceport.

Madura is a native of Los Angeles and a current resident of Melbourne, FL. He graduated in 1960 from Mount Carmel High School in Los Angeles. He is the son of the late Theodore Madura and Virginia Madura of Cerritos, CA.

Madura received a bachelor degree in physics from Loyola-Marymount University in 1964, and master's degrees in international relations from the University of Southern California in 1967 and in meteorology from the University of Michigan in 1973.

At KSC, Madura is employed by NASA as chief of the weather office. He joined the space center in 1993 and serves as lead meteorologist for the Space Shuttle.

He and his wife, Jenna, have a daughter, Tiffany Madura.

The Honoree Award is the highest form of recognition bestowed upon an employee by the NASA Space Flight Awareness Program. The 51 employees selected were part of a contingent of some 250 NASA and contractor employees from throughout the space agency being honored for their professional dedication and outstanding achievement in support of the human space flight program.

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NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

May 28, 1999
KSC Contact: Patti Phelps
KSC Release No. 42I-99

JOHN T. MADURA HONORED FOR ROLE IN SPACE PROGRAM

John Madura, a native of Los Angeles and a current resident of Melbourne, FL, was among 51 Kennedy Space Center (KSC) employees who were honored recently for their exemplary work at the nation's spaceport.

Madura graduated in 1960 from Mount Carmel High School in Los Angeles. He is the son of the late Theodore Madura and Virginia Madura of Cerritos, CA.

Madura received a bachelor degree in physics from Loyola Univesity in 1964, and master's degrees in international relations from the University of Southern California in 1967 and in meteorology from the University of Michigan in 1973.

At KSC, Madura is employed by NASA as chief of the weather office. He joined the space center in 1993 and serves as lead meteorologist for the Space Shuttle.

He and his wife, Jenna, have a daughter, Tiffany Madura.

The Honoree Award is the highest form of recognition bestowed upon an employee by the NASA Space Flight Awareness Program. The 51 employees selected were part of a contingent of some 250 NASA and contractor employees from throughout the space agency being honored for their professional dedication and outstanding achievement in support of the human space flight program.

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NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

May 28, 1999
KSC Contact: Patti Phelps
KSC Release No. 42j-99

BARRY J. MENEGHELLI HONORED FOR ROLE IN SPACE PROGRAM

Barry Joseph Meneghelli, a native of Richmond, CA, and a current resident of Port St. John, FL, was among 51 Kennedy Space Center (KSC) employees who were honored recently for their exemplary work at the nation's spaceport.

He is married to the former Denise Smith, a native of Woburn, MA.

Meneghelli graduated in 1966 from Salesian High School. He is the son of the late Arthur Meneghelli and Teresa Meneghelli of Richmond, CA.

Meneghelli received a bachelor degree in chemistry from the University of San Francisco in 1970, and a doctorate in chemistry from the University of Michigan in 1977.

At KSC, Meneghelli is employed by Dynacs Engineering, Inc., as a principal investigator in the applied chemistry laboratory. He joined the space center in 1992.

He is married to Denise Smith Meneghelli.

The Honoree Award is the highest form of recognition bestowed upon an employee by the NASA Space Flight Awareness Program. The 51 employees selected were part of a contingent of some 250 NASA and contractor employees from throughout the space agency being honored for their professional dedication and outstanding achievement in support of the human space flight program.

The Honorees were given a VIP tour of Kennedy Space Center and attended a special reception. Honoring them were several astronauts and senior officials from NASA and the space industry. The Honorees also were taken to a special VIP viewing area to watch the STS-96 launch of the Space Shuttle Discovery on May 27.

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NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

May 28, 1999
KSC Contact: Patti Phelps
KSC Release No. 42k-99

BARRY J. MENEGHELLI HONORED FOR ROLE IN SPACE PROGRAM

Barry Joseph Meneghelli, a native of Richmond, CA, and a current resident of Port St. John, FL, was among 51 Kennedy Space Center (KSC) employees who were honored recently for their exemplary work at the nation's spaceport.

Meneghelli graduated in 1966 from Salesian High School. He is the son of the late Arthur Meneghelli and Teresa Meneghelli of Richmond, CA.

Meneghelli received a bachelor degree in chemistry from the University of San Francisco in 1970, and a doctorate in chemistry from the University of Michigan in 1977.

At KSC, Meneghelli is employed by Dynacs Engineering, Inc., as a principal investigator in the applied chemistry laboratory. He joined the space center in 1992.

He is married to Denise Smith Meneghelli.

The Honoree Award is the highest form of recognition bestowed upon an employee by the NASA Space Flight Awareness Program. The 51 employees selected were part of a contingent of some 250 NASA and contractor employees from throughout the space agency being honored for their professional dedication and outstanding achievement in support of the human space flight program.

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NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

May 28, 1999
KSC Contact: Patti Phelps
KSC Release No. 42L-99

BARRY J. MENEGHELLI HONORED FOR ROLE IN SPACE PROGRAM

Barry Joseph Meneghelli, who holds a doctorate in chemistry from the University of Michigan, was among 51 Kennedy Space Center (KSC) employees who were honored recently for their exemplary work at the nation's spaceport.

Meneghelli, a native of Richmond, CA, and a current resident of Port St. John, FL, graduated in 1966 from Salesian High School. He is the son of the late Arthur Meneghelli and Teresa Meneghelli of Richmond, CA.

Meneghelli received a bachelor degree in chemistry from the University of San Francisco in 1970, and a doctorate in chemistry from the University of Michigan in 1977. He won a Distinguished Teaching Award from the University of Michigan in 1974.

Meneghelli graduated in 1966 from Salesian High School. He is the son of the late Arthur Meneghelli and Teresa Meneghelli of Richmond, CA.

Meneghelli received a bachelor degree in chemistry from the University of San Francisco in 1970, and a doctorate in chemistry from the University of Michigan in 1977.

At KSC, Meneghelli is employed by Dynacs Engineering, Inc., as a principal investigator in the applied chemistry laboratory. He joined the space center in 1992.

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NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

May 28, 1999
KSC Contact: Patti Phelps
KSC Release No. 42M-99

CARY J. PEADEN HONORED FOR ROLE IN SPACE PROGRAM

Cary Peaden, a native and current resident of Titusville, FL, was among 51 Kennedy Space Center (KSC) employees who were honored recently for their exemplary work at the nation's spaceport.

Peaden graduated in 1980 from Titusville High School. He is the son of Tom Peaden and Joyce Peaden of Titusville.

Peaden received a bachelor degree in electrical engineering from the University of Central Florida in 1986, and master's degrees from UCF and Florida Institute of Technology in 193 and 1995.

At KSC, Peaden is employed by NASA as branch manager in software engineering. He joined the space center in 1997.

Peaden serves as chief of the Engineering and Processing Services Software Engineering Branch, architect/coordinator of the Expendable Launch Vehicle and Payload Carriers Program Information Technology System, technical lead for the Advanced Information Systems Team and project manager for the Project and Resource Management System.

He and his wife, Stephanie Petty Peaden, have three children – Kimberly, 7; Chrisopher, 4; and Joseph, 3.

The Honoree Award is the highest form of recognition bestowed upon an employee by the NASA Space Flight Awareness Program. The 51 employees selected were part of a contingent of some 250 NASA and contractor employees from throughout the space agency being honored for their professional dedication and outstanding achievement in support of the human space flight program.

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NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

May 28, 1999
KSC Contact: Patti Phelps
KSC Release No. 42N-99

SUSAN D. SITKO HONORED FOR ROLE IN SPACE PROGRAM

Susan D. Sitko, a native of Stillwater, MN, and a current resident of Cocoa Beach, FL, was among 51 Kennedy Space Center (KSC) employees who were honored recently for their exemplary work at the nation's spaceport.

Sitko graduated in 1980 from Stillwater High School. She is the daughter of Robert Sitko and Darlene Sitko of Stillwater, MN.

She received bachelor degrees in electrical engineering and computer science from Michigan Technological University in 1985, and a master's in space technology from Florida Institute of Technology in Melbourne, FL, in 1989.

At KSC, Sitko is employed by NASA as a launch and flight operations assistant. Her job entails the preparation of scientific experiments for flight on the Space Shuttle. She joined the space center in 1985 and received a "Silver Snoopy" Award in 1995.

The Honoree Award is the highest form of recognition bestowed upon an employee by the NASA Space Flight Awareness Program. The 51 employees selected were part of a contingent of some 250 NASA and contractor employees from throughout the space agency being honored for their professional dedication and outstanding achievement in support of the human space flight program.

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NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

May 28, 1999
KSC Contact: Patti Phelps
KSC Release No. 42O-99

SUSAN D. SITKO HONORED FOR ROLE IN SPACE PROGRAM

Susan D. Sitko, a native of Stillwater, MN, and a current resident of Cocoa Beach, FL, was among 51 Kennedy Space Center (KSC) employees who were honored recently for their exemplary work at the nation's spaceport.

Sitko was born in Minneapolis and graduated in 1980 from Stillwater High School. She is the daughter of Robert Sitko and Darlene Sitko of Stillwater, MN.

She received bachelor degrees in electrical engineering and computer science from Michigan Technological University in 1985, and a master's in space technology from Florida Institute of Technology in Melbourne, FL, in 1989.

At KSC, Sitko is employed by NASA as a launch and flight operations assistant. Her job entails the preparation of scientific experiments for flight on the Space Shuttle. She joined the space center in 1985 and received a "Silver Snoopy" Award in 1995.

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NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

May 28, 1999
KSC Contact: Bruce Buckingham/George Diller
KSC Release No. 43-99

SECOND INTERNATIONAL SPACE STATION MULTI-ELEMENT INTEGRATION TEST UNDERWAY AT KSC

A second critical test to ensure International Space Station components work together before they are launched into orbit has begun at Kennedy Space Center's Space Station Processing Facility.

The series of Multi-element Integration Tests (MEIT) are expected to pay enormous dividends in terms of avoiding problems that would be costly to address in space.

The first MEIT, which studied various ISS flight components associated with the U.S. Laboratory, was successfully completed in January. The second MEIT, also focused on those components, was initiated Wednesday, May 26, and is scheduled to be completed in June. Three other tests will be held this summer.

The current test combines the P-6 photovoltaic module, the Z-1 truss and Pressurized Mating Adapter 3. All electrical and fluid connections will be hooked up to verify how these Station elements operate together.

"The test is proceeding on schedule and we believe it will provide us with invaluable information for system improvements," said Ralph Fritsche, Multi-Element Integration Test (MEIT) Director.

Fritsche, now leading a NASA/Boeing team making the test, is a member of NASA's Space Station and Shuttle Payloads Directorate, which is responsible for writing procedures and leading implementation of the tests.

The third MEIT, to begin shortly after the current test is completed, will ensure the Italian-built Multi-Purpose Logistics Module, called "Leonardo," and the U.S. Lab work well together. A fourth test will combine the Canadian robotic arm with other Space Station elements. A final test of the elements and flight software will come before the third ISS flight, STS-101, scheduled for December.

After the first test, engineers and technicians worked day and night to trouble shoot design problems and communication and tracking system errors said Cheryl McPhillips, deputy manager for systems integration with KSC's Space Station Hardware Integration Office. McPhillips is responsible for overseeing the MEIT activities.

"Many midnight calls were placed to engineers and designers at Boeing in Houston, as well as Canoga Park and Huntington Beach in California," said McPhillips.

"NASA contacts at Goddard Space Flight Center and Johnson Space Center were also called.

"We're fortunate to have a great civil service and contractor team working together on the MEIT," she continued. "That's especially important when you have to work on unanticipated problems late into the night or on weekends. We have to be able to rely on each other at all times."

In late January, all design and communication and tracking errors were fixed, and the test was accomplished successfully.

"This is what we run these tests for," she noted, "in order to prevent fixes or additional work for the crews in space. We have to be sure before we send the elements up that we've done as much as possible on the ground to assure the elements' efficient and effective operation together."

Once fully assembled on orbit, the station will provide 46,000 cubic feet of pressurized living and working space for astronaut engineers and scientists — equivalent to the passenger cabin volume of two Boeing 747 jumbo jetliners.

For more information on the International Space Station, check out http://station.nasa.gov .

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

June 4, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 44-99

Note to Editors:
DISCOVERY SCHEDULED TO LAND AT KSC COMPLETING MISSION STS-96

The orbiter Discovery is scheduled to land at Kennedy Space Center on Sunday, June 6, at 2:03 a.m. EDT completing its 10-day STS-96 mission that was launched from KSC on May 27, 1999.

Landing at KSC's Shuttle Landing Facility (SLF) is slated to occur on orbit 154 at mission elapsed time 9 days, 19 hours, 13 minutes. Deorbit burn will occur at about 12:54 a.m. Sunday.

Two KSC landing opportunities on Sunday are: 2:03 a.m. and 3:38 a.m. EDT.

Managers decided not to call up the back-up landing location at Edwards Air Force Base (EAFB), CA, for a possible landing there on Sunday though at least two landing opportunities exist there.

If managers must keep Discovery in orbit an additional day, two landing opportunities are available on Monday at KSC and two at EAFB.

KSC Monday landing times are: 2:41 a.m. and 4:17 a.m. EDT.

EAFB Monday landing times are: 5:48 a.m. and 7:25 a.m. EDT.

This landing of Discovery will mark the 47th landing at KSC in the history of Space Shuttle flight. It will be the 18th consecutive landing at KSC and the 25th in the last 26 shuttle flights. This landing also will mark the 11th nighttime landing of the Space Shuttle, the 6th nighttime landing at KSC. Discovery is currently on the 94th Space Shuttle mission in the history of the program.

A press conference with select members of the crew is currently scheduled to occur at 10 a.m. the day after landing. The time and date of this event is subject to change and members of the media should remain in touch with the KSC press site for further details. The event will be held in the KSC Press Site auditorium and carried live on NASA TV. Following the briefing, the entire crew will depart for Houston, TX.

SLF and KSC Ground Operations

The Shuttle Landing Facility was built in 1975. It is 300 feet wide and 15,000 feet

long with 1,000 foot overruns at each end. The strip runs northwest to southeast and is located about 3 miles northwest of the 525-foot tall Vehicle Assembly Building.

Once the orbiter is on the ground, safing operations will commence and the flight crew will prepare the vehicle for post-landing operations. The Crew Transport Vehicle (CTV) will be used to assist the crew, allowing them to leave the vehicle and remove their launch and re-entry suits easier and quicker.

The CTV and other KSC landing convoy operations have been "on-call" since the launch of Discovery May 27. The primary functions of the Space Shuttle recovery convoy are to provide immediate service to the orbiter after landing, assist crew egress, and prepare the orbiter for towing to the Orbiter Processing Facility.

Convoy vehicles are stationed at the SLF's mid-point. About two hours prior to landing, convoy personnel will don SCAPE suits, or Self-Contained Atmospheric Protective Ensemble, and communications checks are made. A warming-up of coolant and purge equipment is conducted and nearly two dozen convoy vehicles are positioned to move onto the runway as quickly and as safely as possible once the orbiter coasts to a stop. When the vehicle is deemed safe of all potential explosive hazards and toxic gases, the purge and coolant umbilical access vehicles move into position at the rear of the orbiter.

Following purge and coolant operations, flight crew egress preparations will begin and the CTV will be moved into position at the crew access hatch located on the orbiter's port side. A physician will board the Shuttle and conduct a brief preliminary examination of the astronauts. The crew will then make preparations to leave the vehicle.

Following departure from the SLF, the crew will be taken to their quarters in the O&C Building, meet with their families and undergo physical examinations. The crew is scheduled to depart for JSC Monday morning.

If Discovery lands at Edwards, an augmented KSC convoy team will be on-site to safe the vehicle, disembark the crew and move the orbiter to the Mate/Demate Device. The turnaround team will be deployed to Edwards by charter aircraft on landing day.

About 3½ hours after Discovery lands at KSC, the orbiter will be towed to Orbiter Processing Facility bay 1 for post-flight deservicing. Operations in the OPF will be made to prepare Discovery for is next Space Shuttle mission, STS-103, currently targeted for launch in October.

-- end --

<u>NOTICE TO EDITORS:</u> The KSC press site will be open Saturday, June 5, from 8 a.m. – 12 noon. The office will then reopen at 9 p.m. Saturday and remain open until 8 a.m. Sunday. Media wishing to view Discovery's landing should be at the KSC press site prior to 1 a.m. Sunday for transport to the SLF.

Additional specific information regarding landing photo opportunities, post-landing press conferences and KSC News Center operational hours is available at the KSC News Center. Recorded status of KSC Space Shuttle launch and landing operations can be reached by calling 407-867-2525.

For automatic e-mail subscriptions to this daily Shuttle status report or KSC-originated press releases, send an Internet electronic mail message to domo@news.ksc.nasa.gov. In the body of the message (not the subject line) type the words "subscribe shuttle-status", or "subscribe ksc-press-release" (do not use quotation marks). The system will reply with a confirmation via e-mail of each subscription.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

June 8, 1999
KSC Contact: George H. Diller
KSC Release No. 45-99

Note to Editors/News Directors:
QUIKSCAT/TITAN II ROCKET READY FOR LAUNCH JUNE 18

The launch of the Quick Scatterometer (QuikSCAT) mission for NASA and the Jet Propulsion Laboratory aboard a U.S. Air Force Titan II rocket is scheduled to occur on Friday, June 18 from Space Launch Complex 4W at Vandenberg Air Force Base, CA. The 10-minute launch window extends from 7:15 - 7:25 p.m. PDT.

The primary instrument on the QuikSCAT spacecraft is "Sea Winds," a specialized microwave radar to collect frequent, high-resolution measurements about the speed and direction of winds near the ocean surface. It is part of NASA's Earth Observing System (EOS) which is designed to address global environmental changes, regional weather patterns and climate.

ACCREDITATION

News media desiring accreditation for the launch of QuikSCAT/Titan II should fax their request on news organization letterhead to:

1st Lt. Thomas Knowles
30th Space Wing Public Affairs Office
Vandenberg Air Force Base, CA
FAX: 805/606-8303

For further information on launch accreditation, the USAF Public Affairs Office can be reached at 805/606-3595.

PRELAUNCH NEWS CONFERENCE

The prelaunch news conference will be held on Thursday, June 17 from 11 a.m. to noon PDT in the main conference room of the NASA Vandenberg Resident Office, Building 840, Vandenberg Air Force Base, CA. Participants will be:

Lt. Col. Joe Hogler, Titan II Launch Director, 30th Space Wing
Vandenberg Air Force Base, CA

Ray Lugo, NASA Mission Director
Kennedy Space Center, FL

James Graf, QuikSCAT Project Manager
Jet Propulsion Laboratory

Captain Eric Barella, Launch Weather Officer, 30th Weather Squadron
Vandenberg Air Force Base, CA

A question and answer capability will be available from other NASA centers.

Media desiring to cover the prelaunch news conference should meet at the south gate of Vandenberg Air Force Base on California State Road 246 at 10:30 a.m. They will be escorted to the NASA Vandenberg Resident Office.

REMOTE CAMERAS

Media desiring to establish sound-activated remote cameras at the launch pad will depart from the south gate of Vandenberg Air Force Base at 1:40 p.m. on Thursday, June 17, for SLC-4.

LAUNCH DAY PRESS COVERAGE

On launch day, June 18, media covering the QuikSCAT/Titan II launch should be at the main gate located on California State Road 1 at 6 p.m. to be escorted to the press site located on north Vandenberg Air Force Base. After launch, media will be escorted back to the main gate. A post-launch news conference will not be held.

NASA TELEVISION AND VOICE CIRCUIT COVERAGE

NASA Television will carry the prelaunch news conference starting at 11 a.m. PDT on Thursday, June 17. On launch day, June 18, NASA TV coverage of the countdown will begin at 5:30 p.m. PDT and conclude after spacecraft separation that occurs at 58 minutes into flight.

NASA Television is carried on GE-2, transponder 9C located at 85 degrees West longitude. Audio only will be available on the "V" circuits that may be reached by dialing 407/867-1220, 1240, 1260, 7135, 4003, and 4920.

A Webcast of the QuikSCAT launch will also be available on http://www.ksc.nasa.gov/cgi-bin/rr.pl?kscnasa.rm It is also available on the NASA-KSC Home Page by choosing KSC Live Video Feeds followed by NASA Select Coverage.

NASA QUIKSCAT NEWS CENTER

The QuikSCAT News Center at the NASA Vandenberg Resident Office will be staffed beginning Tuesday, June 15 and may be reached at 805/605-3051. A recorded status report will also be available starting at that time by dialing 805/734-2693.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

June 14, 1999
KSC Contact: George H. Diller
KSC Release No. 46-99

INTERNATIONAL SPACE STATION CENTER TRUSS SEGMENT ARRIVES AT KSC TO BEGIN PROCESSING

The International Space Station truss, which will become the backbone of the orbiting International Space Station (ISS), arrived Saturday morning, June 12 at KSC's Shuttle Landing Facility aboard the "Super Guppy" transport aircraft. It was flown from a division of the Boeing Company in Huntington Beach, CA.

This truss segment, called "S Zero," (S0) is a 44-by-15 foot structure weighing 30,800 pounds when fully outfitted and ready for launch. This segment will be at the center of the 10-truss, girder-like structure that will ultimately extend the length of a football field. Scheduled for launch in the Spring of 2001, astronauts will attach the S0 truss in space to the U.S. Laboratory "Destiny." Later, from each side of the center truss, the astronauts will attach the other trusses.

During processing at KSC, the Canadian Mobile Transporter will be installed on the truss structure. Later, during on-orbit assembly of the International Space Station, Canada's Mobile Service System will move its 55-foot robotic arm along tracks attached to the truss. Other items to be attached to the truss at KSC include power distribution system modules, a heat pipe radiator for cooling, computers, and a pair of rate gyroscopes. Four Global Positioning System antennas are already installed.

The S0 truss is being transported to the Operations and Checkout Building which has recently been reconfigured from processing Spacelab modules to processing ISS trusses.

NOTE TO EDITORS: There will be a media opportunity later this week to see the S0 truss in the high bay of the Operations and Checkout Building. Spokespersons will be on hand from NASA and Boeing to discuss the truss and its processing activities at KSC, and for a familiarization of the reconfigured O&C high bay for truss work. Those media wishing to attend should be at the KSC Press Site at 1 p.m. on Friday, June 18.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

June 16, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 47-99

Launch Advisory:
QUIKSCAT LAUNCH POSTPONED

The launch of NASA's QuikSCAT spacecraft aboard an Air Force Titan II vehicle from Vandenberg Air Force Base, CA, has been delayed at least 24 hours to no earlier than Saturday, June 19 at 7:15 p.m.

The additional time is required to allow engineers an opportunity to troubleshoot a possible telemetry data problem with an inertial measurement unit on the Titan II vehicle.

Additional information will be available following an afternoon teleconference at VAFB Wednesday afternoon.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

June 16, 1999
KSC Contact: Joel Wells
KSC Release No. 48-99

KSC AND 45TH SPACE WING OBSERVE SUPER SAFETY AND HEALTH DAY JUNE 17

Kennedy Space Center and the Cape Canaveral Air Station 45th Space Wing are suspending normal operations in order to focus completely on safety and health. On June 17, 1999, thousands of NASA and Air Force employees and contractors, will depart from their normal activities to participate in a full day of informative activities.

The event's theme is "Safety and Health Go Hand in Hand." Planned activities include an interactive employee question and answer session with an expert panel, vendor displays, organizational training and visits by NASA senior management and Astronauts.

Super Safety and Health Day represents the commitment of KSC Director Roy Bridges and Patrick Air Force Base Commander, Brig. Gen. Randall Starbuck to the paramount guiding principle of safety and health first. "This day is an investment in the well-being of our workforce," Bridges said, "It is also a chance for all of us to renew our commitments."

Loren Shriver, KSC Deputy Director for Launch and Payload Processing, will open the event and introduce Roy Bridges and PAFB Vice Commander, Col. Thomas Deppe. The keynote speaker is Captain Dennis Fitch, United Airlines pilot and instructor. Fitch assisted in the investigation that followed the United Airlines Flight 232 accident.

The question and answer panel includes Roy Bridges; Tom Deppe; Ron Dittemore, Space Shuttle Program Manager; Burton Summerfield, Associate Director, KSC Biomedical Office; Ed Adamek, Vice President and Ground Operations Associate Program Manager, United Space Alliance; Bill Hickman, General Manager, Space Gateway Support; Col. William Swindling, Commander 45th Space Wing Medical Group; and Jim Schofield, Boeing Payload Program Manager. Also participating are Aerospace Safety Advisory Panel members, Bob Sieck and Richard Blomberg.

The three-hour session will be broadcast live on closed circuit television for all KSC, CCAS, and PAFB employees to view. Viewers will be encouraged to submit questions during the panel discussion via telephone or e-mail.

Following the morning questions and answer session, employees will view about 150 safety and health displays set up around KSC, CCAS, and PAFB.

NOTE TO EDITORS: News media are invited to watch the morning panel briefing and the employee question and answer session from televisions at the KSC Press Site. Media interested in touring various vendor display sites should report to the KSC Press Site at 1 p.m. on Thursday, June 17.

For automatic e-mail subscriptions to this daily Shuttle status report or KSC-originated press releases, send an Internet electronic mail message to domo@news.ksc.nasa.gov. In the body of the message (not the subject line) type the words "subscribe shuttle-status", or "subscribe ksc-press-release" (do not use quotation marks). The system will reply with a confirmation via e-mail of each subscription.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

June 16, 1999
KSC Contact: George H. Diller
KSC Release No. 49-99

Note to Editors/News Directors:
FUSE SCHEDULED FOR LAUNCH ON DELTA ROCKET JUNE 23

The launch of NASA's Far Ultraviolet Spectroscopic Explorer (FUSE) spacecraft aboard a Boeing Delta II rocket is scheduled for Wednesday, June 23, 1999. The launch window extends from 11:39 a.m. - 12:57 p.m. EDT. Liftoff will occur from Pad A at Launch Complex 17 on Cape Canaveral Air Station.

NASA's newest space telescope, FUSE is designed to scour the cosmos for the fossil record of the origins of the universe. Scientists will use FUSE to study the earliest relics of the Big Bang—hydrogen and deuterium—to unlock the secrets of how the primordial chemical elements of which all the stars, planets and life evolved, were created and distributed since the birth of the Universe.

The FUSE spacecraft has completed final checkout at Hangar AE and was mated to the Boeing Delta II rocket at the launch pad today. The Delta fairing is to be installed around the spacecraft on June 19.

PRELAUNCH NEWS CONFERENCE

A prelaunch news conference is scheduled for Tuesday, June 22 at 2 p.m. EDT in the KSC News Center auditorium. Participating in the briefing will be:

- Dr. Harley Thronson, Acting Director, NASA Origins Program NASA Headquarters
- Charles Dovale, NASA Launch Manager
  Kennedy Space Center
- Joy Bryant, Delta II Flight Director
  The Boeing Company
- Dennis McCarthy, FUSE Project Manager
  Johns Hopkins University
- Joel Tumbiolo, Launch Weather Officer
  Department of the Air Force

No post-launch news conference will be held.

ACCREDITATION

Those media without permanent accreditation who wish to cover the launch of FUSE, including the prelaunch news conference on L-1 day, should send a letter of request to the NASA-KSC News Center on news organization letterhead. It should include name, birth date and Social Security number or passport number. Letters should be faxed to 407/867-2692 or addressed to:

FUSE Launch Accreditation
NASA AB-F1
Kennedy Space Center, FL 32899

On Tuesday, June 22, mission badges may be picked up at the news media Pass & Identification Building located at Gate 2 on State Road 3 between 10 a.m. and 2 p.m. On launch day, June 23, FUSE mission badges will be available outside the Gate 1 Pass & Identification building on Cape Canaveral Air Station located on SR 401 prior to departure for Press Site 1. A Delta/FUSE mission badge is required for all media covering the launch from Press Site 1.

For further information on FUSE launch accreditation, contact Christy Moore at the NASA News Center at 407/867-2468.

REMOTE CAMERAS

On Tuesday, June 22 at 11 a.m., a NASA van will depart from the NASA-KSC News Center for Launch Complex 17 for media photographers who wish to establish remote cameras at Pad 17-A.

LAUNCH DAY PRESS COVERAGE

On Wednesday, June 23, media covering the launch should meet in the parking lot of the Gate 1 Pass & Identification Building on Cape Canaveral Air Station located on SR 401. The convoy departure for Press Site 1 will be at 10:30 a.m. After launch, media may leave unescorted via Gate 1 only.

The NASA-KSC News Center will be open on launch day from 8 a.m. until 4:30 p.m.

NASA TELEVISION AND V CIRCUIT COVERAGE

NASA Television will carry the prelaunch news conference starting at 2 p.m. EDT on Tuesday, June 22. On launch day, countdown coverage will begin at 10 a.m. EDT and conclude after spacecraft separation from the Delta rocket occurs approximately 73 minutes later.

NASA Television is available on GE-2, transponder 9C located at 85 degrees West longitude. Audio only of FUSE events will also be available on the "V" circuits which may be dialed directly at 407/867-1220, 1240, 1260, 7135, 4003, 4920.

A launch Webcast will also be available on the NASA-KSC Home Page.

RECORDED PRELAUNCH STATUS REPORTS

The NASA-KSC codaphone will carry FUSE prelaunch status reports beginning at L-2 days, on Monday, June 21, and may be dialed at 407/867-2525.

For automatic e-mail subscriptions to this daily Shuttle status report or KSC-originated press releases, send an Internet electronic mail message to domo@news.ksc.nasa.gov. In the body of the message (not the subject line) type the words "subscribe shuttle-status", or "subscribe ksc-press-release" (do not use quotation marks). The system will reply with a confirmation via e-mail of each subscription.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

June 17, 1999
KSC Contact: George H. Diller
KSC Release No. 50-99

Note to Editors:
MEDIA OPPORTUNITY FOR SPACE STATION TRUSS SCHEDULED FOR FRIDAY, JUNE 18

A media opportunity is planned on Friday afternoon to see the recently arrived International Space Station "S Zero Truss" (S0) in the high bay of the Operations and Checkout building. Spokespersons will be on hand from NASA and Boeing to discuss the truss and its processing activities at KSC, and for a familiarization of the O&C high bay where the S0 truss and future trusses will be processed. Those media attending will depart the KSC Press Site at 1 p.m. on Friday, June 18.

The S0 truss will become the backbone of the orbiting International Space Station. It arrived on Saturday, June 12 at KSC's Shuttle Landing Facility aboard the "Super Guppy" transport aircraft. It was flown from a division of the Boeing Company in Huntington Beach, CA.

This S0 truss segment is a 44-by-15 foot structure weighing 30,800 pounds when fully outfitted and ready for launch. This segment will be at the center of the 10-truss, girder-like structure that will ultimately extend the length of a football field. Scheduled for launch in the Spring of 2001, astronauts will attach the S0 truss in space to the U.S. Laboratory "Destiny." Later, from each side of the center truss, the astronauts will attach the other trusses.

During processing at KSC, the Canadian Mobile Transporter will be installed on the truss structure. During on-orbit assembly of the International Space Station, Canada's Mobile Service System will move its 55-foot robotic arm along tracks attached to the truss. Other items to be attached to the truss at KSC include power distribution system modules, a heat pipe radiator for cooling, computers, and a pair of rate gyroscopes. Four Global Positioning System antennas are already installed.

The Operations and Checkout Building has recently been reconfigured from processing Spacelab modules to processing space station trusses.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

June 18, 1999
KSC Contact: Joel Wells
KSC Release No. 51-99

Note to Editors:
KSC COUNTDOWN TEST OFFERS MEDIA OPPORTUNITIES WITH STS-93 ASTRONAUTS

The STS-93 astronauts arrive at Kennedy Space Center Monday, June 21, to participate in Terminal Countdown Demonstration Test (TCDT) activities. Media representatives have several opportunities next week to photograph and meet the crew.

The flight crew is comprised of Commander Eileen Collins, Pilot Jeff Ashby and Mission specialists Steve Hawley, Catherine Coleman and French Astronaut Michel Tognini.

A countdown test is held prior to each Space Shuttle flight. The launch day dress rehearsal on Thursday follows three days of emergency egress training exercises, flights in the Shuttle Training Aircraft and an inspection of the Chandra X-ray Observatory payload inside Shuttle Columbia's payload bay.

Monday at about 5:30 p.m., the crew is scheduled to arrive at KSC's Shuttle Landing Facility. Media interested in a crew arrival statement and photo opportunity will depart from the KSC Press Site at 4:30 p.m. News media will depart the Press Site at 7:30 a.m. on Tuesday for a photo opportunity during the crew's M113 tracked vehicle training session. (***Correction:*** *To assure that the STS-93 crew's TCDT training proceeds on schedule, photos and video of the M113 tracked vehicle session will be provided by NASA. Media will not be able to attend this portion of the crew's training.*)

The crew will speak informally to interested media just after their scheduled emergency egress walk-down at Launch Pad 39B. Media interested in participating in this photo opportunity and question and answer session should be at the KSC Press Site by 2:30 p.m. on Wednesday for transport to the pad. This event will be carried live on NASA TV.

At about 7:45 a.m. on Thursday, the astronauts will depart KSC's crew quarters wearing their launch and entry suits headed for Pad 39B. Media interested in that photo opportunity will be escorted from the Press Site at 6:45 a.m. At about 8:15 a.m. the crew begins ingress into Shuttle Columbia's crew compartment. The dress rehearsal culminates with a simulated main engine cut-off at about 11 a.m. The crew is scheduled to depart KSC for their homes in Houston, TX, Thursday at about 2:15 p.m.

FINAL NOTE: Media needing credentials must call the KSC Press Site at 407-867-2468 by noon Monday, June 21.

For automatic e-mail subscriptions to this daily Shuttle status report or KSC-originated press releases, send an Internet electronic mail message to domo@news.ksc.nasa.gov. In the body of the message (not the subject line) type the words "subscribe shuttle-status", or "subscribe ksc-press-release" (do not use quotation marks). The system will reply with a confirmation via e-mail of each subscription.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

June 18, 1999
KSC Contact: Lisa Malone
KSC Release No. 52-99

KENNEDY SPACE CENTER HOSTS ANNUAL COMMUNITY LEADERS BRIEFING JUNE 22

"Taking a Leap: A New Millennium of Space Exploration" is the theme of this year's annual community leaders briefing to be held June 22 at the KSC Visitor Complex.

KSC Director Roy D. Bridges, Jr., and KSC senior managers will meet with community leaders from Brevard County and the State of Florida about present projections for future plans of America's space program and the economic impact these plans may have in the local community. Leaders will hear about KSC's strategic partnerships, expertise as a Spaceport Technology Center, the center's integrated management system and ISO 9001 certification.

Attendees will gather at Information Central at 7:30 a.m. for a continental breakfast and then proceed to the IMAX 2 theater for the presentation 8:30 – 9:30 a.m. Following the briefing, guests will have an opportunity to tour the Visitor Complex's newest attractions -- Robot Scouts, the new Universe Theater's "Quest for Life" and the Merritt Island Wildlife Exhibit.

Several hundred invitations have been sent to a wide variety of community leaders, business executives, state and local government officials and other community organizations.

Media representatives are invited to attend and should drive directly to the KSC Visitor's Complex and proceed to Information Central. Further information may be obtained by contacting the KSC News Center at 407/867-2468.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

June 21, 1999
KSC Contact: George H. Diller
KSC Release No. 53-99

Launch Advisory:
DELTA/FUSE LAUNCH POSTPONED 24 HOURS

The launch of NASA's Far Ultraviolet Spectroscopic Explorer (FUSE) spacecraft aboard a Boeing Delta II rocket scheduled for June 23 has been postponed 24 hours. It has been difficult to maintain the schedule of work at the launch pad due to thunderstorms which have prevailed in the Cape Canaveral vicinity this past weekend. Launch has been rescheduled for Thursday, June 24. The launch window is unchanged and extends from 11:39 a.m. to 12:07 p.m.

The prelaunch news conference has been rescheduled for Wednesday, June 23 at 2 p.m. and will be carried live on NASA Television. For photographers, remote camera placement at Pad 17-A has also been rescheduled for Wednesday with departure from the NASA News Center at 11 a.m.

In support of L-1 day activities, the Pass & Identification Building for the news media at Gate 2 on State Road 3, Merritt Island will be open on Wednesday, June 23, from 10 a.m. to 2 p.m. for media accreditation.

On launch day, June 24, media will depart from the parking lot of the Gate 1 Pass & Identification building on Cape Canaveral Air Station at 10:30 a.m. for Press Site 1. Press badges can be obtained beginning at 10 a.m. A Delta/FUSE mission press badge is required for all media covering the launch from Press Site 1 on Cape Canaveral Air Station.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

June 29, 1999
KSC Contact: Joel Wells
KSC Release No. 55-99

KSC'S UPGRADED EMERGENCY POWER PLANT DELIVERS RELIABILITY AND SAVINGS

KSC's critical Space Shuttle operations in the Launch Complex-39 area have lately been dependent on a forty-year-old backup power plant. Now, a modernized Emergency Power Plant provides increased reliability, doubles power capacity and saves about $770,000 every year in the process.

Known as the LC-39 Emergency Power Plant, the facility provides emergency power and safeguards KSC launch systems when normal utility power is interrupted. The recent overhaul replaced five 1-megawatt diesel generators built in the 1950s, with five 2-megawatt, state-of-the-art generators and modern controls. The upgrade doubles the plant's capacity to 10 megawatts.

The new control system allows NASA to participate in the Commercial Industrial Load Control program offered by Florida Power & Light (FPL), by using the new plant to reduce KSC's electrical demand on FPL's power grid during peak periods. In turn, FPL charges KSC a lower billing rate which translates into hundreds of thousands in annual cost savings. KSC managers plan to payoff the $6.84 million construction costs with money gleaned from the annual savings.

"We partnered with FPL on this project because it benefits all parties involved," said KSC's Director of Installation Operations, Marvin Jones. "FPL arranged for third-party funding, and their design and installation team turned the plant over to us three months early – saving us $191,000 up front. We're realizing savings already and expect even more to come."

To celebrate the activation of the improved power plant, KSC is hosting a ribbon cutting ceremony on July 1 at 10 a.m. Director of Installation Operations, Marvin Jones will open the ceremony followed by remarks from KSC Director, Roy Bridges and Director of Shuttle Processing, David King. Expected participants include project partners Florida Power & Light Energy Services, SELAH Group, Military Construction Corporation, Ringhaver Equipment Company, Space Gateway Services and United Space Alliance.

NOTE TO EDITORS: Media interested in attending this event must contact the KSC Press Site by 4:30 p.m. on Wednesday, June 30. Media will depart for the ribbon cutting at 9 a.m. on Thursday, July 1.

send an Internet electronic mail message to domo@news.ksc.nasa.gov. In the body of the message (not the subject line) type the words "subscribe shuttle-status", or "subscribe ksc-press-release" (do not use quotation marks). The system will reply with a confirmation via e-mail of each subscription.

STS-93
Columbia
First Female Commander Leads Launch of Most Powerful X-ray Telescope

KSC Release No. 56-99
June 1999

Astronaut Eileen Collins (Col., USAF) will make history as she becomes the first woman to command a Space Shuttle and lead a five-day mission to deploy the heaviest, largest and most powerful X-ray telescope ever launched into space.

The Chandra X-ray Observatory, NASA's latest X-ray telescope, will allow scientists to peer into an invisible and violent realm of the cosmos that contains some of the most intriguing mysteries in astronomy. With it's X-ray vision, Chandra will study objects ranging from comets in our solar system to quasars at the edge of the universe.

Chandra's observations should help provide long-sought answers to scientific questions on the presence of "dark matter" in the universe and the source of explosive activities in distant galaxies. Measuring dark matter is of great interest to scientists and others because it could help us determine whether the universe will eventually cave in on itself or expand indefinitely.

With NASA's other "Great Observatories" in space - including the Hubble Space Telescope and the Compton Gamma Ray Observatory -- Chandra will enable scientists to study the universe across the spectrum, ranging from infrared, visible and ultraviolet light to X-ray and high-energy gamma rays.

The observatory will fly more than one-third of the way to the Moon. With four pairs of eyes, the cleanest and smoothest mirrors ever made, Chandra's high resolving power is equal to the ability to read the letters on a stop sign from more than 12 miles away. The telescope is 20 to 50 times more sensitive than any other X-ray telescope.

Chandra is 45 feet long and weighs 52,000 pounds with its attached booster, making it the largest and heaviest satellite ever launched on a Space Shuttle. The satellite consists of three major elements: a spacecraft with an inertial upper stage rocket motor, a telescope, and a science instrument module.

The observatory was originally called the Advanced X-ray Astrophysics Facility, or AXAF, but was renamed in honor of the late Indian-American Nobel Laureate Subrahmanyan Chandrasekhar. "Chandra" won the Nobel Prize in 1983 for his theoretical studies of physical processes important to the structure and evolution of stars. His name means "moon" or "luminous" in Sanskrit, an apt name for an orbiting observatory.

Collins will be joined on the flight deck by Pilot Jeffrey S. Ashby (Capt., USN), Mission Specialists Steven A. Hawley, Ph.D., and Catherine G. "Cady" Coleman, (Lt. Col., USAF), Ph.D., and CNES Astronaut Michel Tognini (Col., French Air Force).

The crew will deploy Chandra approximately seven hours after liftoff into a relatively low altitude of 153 miles. Once released from the orbiter's cargo bay, Chandra will use propulsion from an attached Inertial Upper Stage rocket as well as firings from its own on-board rocket motors to reach its working orbit. Once there, it will draw power from its six solar panels. The observatory will be turned on slowly and fine-tuned to become fully functioning about nine weeks after being in orbit. Chandra is expected to remain in orbit collecting information for at least five years.

In contrast to the Hubble's circular, low-altitude course, Chandra will travel a highly elliptical path that ranges from 6,200 miles to 86,000 miles above Earth. Circling every 64 hours, the observatory will move well outside the planetary radiation belts that would interfere with its sensitive instruments. Such a route allows Chandra 55 hours of uninterrupted measurements per orbit.

STS-93 is the 95th Space Shuttle mission and 26th flight of Columbia. The Space Shuttle will lift off from Launch Pad 39B. The orbital insertion altitude and inclination will be 153 nautical miles (284 kilometers/176 statute miles)/28.5 degrees to the equator. Landing is scheduled at KSC's Shuttle Landing facility.

STS-93 will be the shortest scheduled Space Shuttle mission since 1990. Its duration is planned to be about 4 days, 23 hours.

The Crew

Commander Eileen M. Collins (Col., USAF) will be the first woman to command a Space Shuttle flight. A pilot on two previous missions, Collins has spent more than 419 hours in space. During her first flight, Discovery flew within 30 feet of Mir in a dress rehearsal for the first Shuttle/Mir docking. Her second flight was the sixth Shuttle/Mir docking mission, which delivered astronaut Mike Foale to Mir and returned astronaut Jerry Linenger to Earth.

Collins served as an Air Force instruction pilot before joining the astronaut program in 1990. The New York native holds master's degrees in operations research and space systems management.

Pilot Jeffrey S. Ashby (Capt., USN) will be making his first flight. During his career as a Navy pilot, Ashby earned many honors, including a Distinguished Flying Cross and a designation as Navy Attack Aviator of the Year in 1991. His assignments included flights during three operations in Iraq and one in Somalia. NASA selected Ashby to its astronaut program in December of 1994.

Mission Specialist Steven A. Hawley, Ph.D., brings the experience of four previous flights and more than 651 hours in space to his duties as a mission specialist. He has been part of the astronaut program since 1978. Hawley played vital roles as a simulator pilot for software checkout before STS-1 and as a member of the astronaut support crew for the next three missions. He holds a doctorate in astronomy and astrophysics.

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Additional STS-93 Payloads and Experiments

Columbia will carry several smaller payloads, including the Southwest Ultraviolet Imaging System. This mid-deck payload allows the measurement of emissions in the UV spectrum that cannot be observed from Earth.

The imaging system includes a 7-inch UV telescope and a UV-sensitive image-intensive Charge-Coupled Device camera that frames at video frame rates. The video-framing freezes out attitude jitter of the Shuttle, eliminating the need for expensive pointing control platforms typically used by astronomy payloads aboard the Shuttle. By processing the video data in a ground-based computer, scientists will be able to obtain sensitive measurements of the Moon, the Earth, other planets and Vulcanoids, which are small bodies orbiting close to the Sun.

The Midcourse Space Experiment will use orbiter thruster firings to calibrate and evaluate UV, infrared and visible sensors on the MSX satellite, which was launched in April 1996. Thruster firings will also be used to create ionospheric disturbances for observation by Shuttle Ionospheric Modification with Pulsed Local Exhaust radar.

The Plant Growth Investigations in Microgravity payload will study the effects of space flight on plants. Genetically

engineered plants will be monitored to determine various sources of plant stresses that affect plant growth and gene expression. Another series of plant experiments will be conducted in the Biological Research in a Canister payload.

The temperature-controlled Commercial Generic Bioprocessing Apparatus Isothermal Containment Module will be used to stow and process several experiments, including one using fruit fly larvae. The experiment will examine the effects of microgravity on the development of neural connections between specific motor neurons and their targets in the flies' muscle fibers. Other experiments in the module will study bacteria growth, protein crystal growth and the predator/prey relationship between ladybugs and aphids.

Go to the *KSC Fact Sheets* home page

Go to the *KSC Press Releases* home page

NASA Facts

National Aeronautics and
Space Administration

John F. Kennedy Space Center
Kennedy Space Center, Florida 32899
AC 407 867-2468

June 1999
KSC Release No. 56-99

STS-93/Columbia

First Female Commander Leads Launch of Most Powerful X-ray Telescope

Astronaut Eileen Collins (Col., USAF) will make history as she becomes the first woman to command a Space Shuttle. She will lead a five-day mission to deploy the heaviest, largest and most powerful X-ray telescope ever launched into space.

The Chandra X-ray Observatory, NASA's latest X-ray telescope, will allow scientists to peer into an invisible and violent realm of the cosmos that contains some of the most intriguing mysteries in astronomy. With its X-ray vision, Chandra will study objects ranging from comets in our solar system to quasars at the edge of the universe.

Chandra's observations should help provide long-sought answers to scientific questions on the presence of "dark matter" in the universe and the source of explosive activities in distant galaxies. Measuring dark matter is of great interest to scientists and others because it could help us determine whether the universe will eventually cave in on itself or expand indefinitely.

With NASA's other "Great Observatories" in space – including the Hubble Space Telescope and the Compton Gamma Ray Observatory — Chandra will enable scientists to study the universe across the spectrum, ranging from infrared, visible and ultraviolet light to X-ray and high-energy gamma rays.

The observatory will fly more than one-third of the way to the Moon. With four pairs of eyes, the cleanest and smoothest mirrors ever made, Chandra's high resolving power is equal to the ability to read the letters on a stop sign from more than 12 miles away. The telescope is 20 to 50 times more sensitive than any other X-ray telescope.

Chandra is 45 feet long and weighs 52,000 pounds with its attached booster, making it the largest and heaviest satellite ever launched on a Space Shuttle. The satellite consists of three major elements: a spacecraft with an inertial upper stage rocket motor, a telescope, and a science instrument module.

The observatory was originally called the Advanced X-ray Astrophysics Facility, or AXAF, but was renamed in honor of the late Indian-American Nobel Laureate Subrahmanyan Chandrasekhar. "Chandra" won the Nobel Prize in 1983 for his theoretical studies of physical processes important to the structure and evolution of stars. His name means "moon" or "luminous" in Sanskrit, an apt name for an orbiting observatory.

Collins will be joined on the flight deck by Pilot Jeffrey S. Ashby (Capt., USN), Mission Specialists Steven A. Hawley, Ph.D., and Catherine G. "Cady" Coleman, Ph.D., (Lt. Col., USAF) and CNES Astronaut Michel Tognini (Col., French Air Force).

The crew will deploy Chandra approximately seven hours after liftoff into a relatively low altitude of 153 miles. Once released from the orbiter's cargo bay, Chandra will use propulsion from an attached Inertial Upper Stage rocket as well as firings from its own on-board rocket motors to reach its working orbit. Once there, it will draw power from its six solar panels. The observatory will be turned on slowly and fine-tuned to become fully functioning

after about nine weeks in orbit. Chandra is expected to remain in orbit collecting information for at least five years.

In contrast to Hubble's circular, low-altitude course, Chandra will travel a highly elliptical path that ranges from 6,200 miles to 86,000 miles above Earth. Circling every 64 hours, the observatory will move well outside the planetary radiation belts that would interfere with its sensitive instruments. Such a route allows Chandra 55 hours of uninterrupted measurements per orbit.

STS-93 is the 95th Space Shuttle mission and 26th flight of Columbia. The Space Shuttle will lift off from Launch Pad 39B. The orbital insertion altitude and inclination will be 153 nautical miles (284 kilometers/176 statute miles)/28.5 degrees to the equator. Landing is scheduled at KSC's Shuttle Landing Facility.

STS-93 will be the shortest scheduled Space Shuttle mission since 1990. Its duration is planned to be about 4 days, 23 hours.

The Crew

Commander Eileen M. Collins (Col., USAF) will be the first woman to command a Space Shuttle flight. A pilot on two previous missions, Collins has spent more than 419 hours in space. During her first flight, Discovery flew within 30 feet of Mir in a dress rehearsal for the first Shuttle/Mir docking. Her second flight was the sixth Shuttle/Mir docking mission, which delivered astronaut Mike Foale to Mir and returned astronaut Jerry Linenger to Earth.

Collins served as an Air Force instruction pilot before joining the astronaut program in 1990. The New York native holds master's degrees in operations research and space systems management.

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NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

July 8, 1999
KSC Contact: Lisa Malone
KSC Release No. 57-99

Note to Editors:
NASA MANAGERS SET JULY 20 AS LAUNCH DATE FOR CHANDRA TELESCOPE

NASA managers set Tuesday, July 20, 1999, as the official launch date for NASA's second Space Shuttle Mission of the year that will mark the launch of the first female Shuttle Commander and the Chandra X-Ray Observatory.

Columbia is scheduled to liftoff from Launch Pad 39-B at the Kennedy Space Center on July 20 at the opening of a 46-minute launch window at 12:36 a.m. EDT. Columbia's planned five-day mission is scheduled to end with a night landing at the Kennedy Space Center just after 11:30 p.m. EDT on July 24.

Following its deployment from the Shuttle, Chandra will join the Hubble Space Telescope and the Compton Gamma Ray Observatory as the next in NASA's series of "Great Observatories." Chandra will spend at least five years in a highly elliptical orbit which will carry it one-third of the way to the moon to observe invisible and often violent realms of the cosmos containing some of the most intriguing mysteries in astronomy ranging from comets in our solar system to quasars at the edge of the universe.

Columbia's 26th flight is led by Air Force Col. Eileen Collins, who will command a Space Shuttle mission following two previous flights as a pilot. The STS-93 Pilot is Navy Captain Jeff Ashby who will be making his first flight into space. The three mission specialists for the flight are: Air Force Lt. Col. Catherine "Cady" Coleman, who will be making her second flight into space; Steven A. Hawley, Ph.D, making his fifth flight; and French Air Force Col. Michel Tognini of the French Space Agency (CNES), who is making his first Space Shuttle flight and second trip into space after spending two weeks on the Mir Space Station as a visiting cosmonaut in 1992.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

July 14, 1999
KSC Contact: Lisa Malone
KSC Release No. 58-99

Note to Editors/News Directors:
CELEBRATION PLANNED FOR 30TH ANNIVERSARY OF APOLLO 11 MOON LANDING

Thirty years ago this month, humans walked on the moon for the first time. Streets were empty and idle chatter hushed as the world stood still for the first steps onto our closest celestial neighbor 250,000 miles away.

On the 30-year anniversary of the Apollo 11 launch from Kennedy Space Center, moon walkers Neil Armstrong and Buzz Aldrin will participate in a news media availability on Friday, July 16 from 5:30 – 6 p.m. EDT. Other Apollo astronauts who may participate are: Eugene Cernan, Walter Cunningham, Charles Duke, Walter Schirra, Alfred Worden and John Young. This event will be carried live on NASA Television from a replica of the Apollo firing room inside the Apollo/Saturn V Center. Media must be present to ask questions.

To highlight the contributions of the thousands of aerospace employees who made the Apollo program possible, NASA in cooperation with the Apollo 11 Commemoration Association, and Delaware North Park Services will host a dinner July 16 at the Apollo/Saturn V Center.

During the dinner program, astronauts will share their memories with Apollo veterans, current NASA employees, contractors and their families. Opening remarks are at 8 p.m., the program begins at 9 p.m. and includes remarks from NASA Administrator Daniel S. Goldin and KSC Center Director Roy D. Bridges, Jr. The event will conclude at around 9:45 p.m. with the world premier performance of a new musical composition by composer and performer Jonn Serrie commemorating the Apollo program.

KSC will be the focal point for one of only a few national celebrations of the 30th anniversary of the first moon landing and its impact on human history during this century and the millennium.

News media needing credentials should fax their requests on letterhead to the NASA Press Site at (407) 867-2692. The STS-93 and the 1999 annual media credentials will be valid for this event. Please call the NASA Press Site to make arrangements to pick up badges.

News media must be at the KSC Press Site by 4:45 p.m. July 16 for transport to the Apollo/ Saturn V Center (ASVC) to cover the astronaut press availability.

Transportation back to the Press Site will be provided. Media covering the dinner program need to be at the Press Site by 7:30 p.m. July 16 for transport to a designated media area inside the ASVC. A mult box and risers for photographers will be provided. NASA will transport media back to the Press Site immediately following the conclusion of the program.

Related Information:

http://www.hq.nasa.gov/office/pao/History/ap11ann/events.htm

This week, NASA's Video File is featuring a variety of Apollo 11 footage documenting this historical event. The Video File airs daily at noon, 3 p.m., 6 p.m., 9 p.m. and midnight Eastern Time. NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz.

- Delaware North has a full schedule of media events planned July 16 and 17. Please contact Amy Maguire at 407-449-4269 for details.
- For information on The Apollo 11 Commemoration Association, please call 407-783-4421.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

July 13, 1999
KSC Contact: Joel Wells
KSC Release No. 59-99

LAUNCH COUNTDOWN FOR STS-93 SET TO BEGIN JULY 16

NASA will begin the countdown for launch of Space Shuttle Columbia on mission STS-93 on July 16, at 10 p.m. EDT at the T-43 hour mark. The KSC launch team will conduct the countdown from Firing Room 1 of the Launch Control Center.

The countdown includes 31 hours and 26 minutes of built-in hold time leading to a launch at 12:36 a.m. on July 20. The launch window opens at 12:36 a.m. and extends for 46 minutes.

This will be the first Space Shuttle mission commanded by a woman, Eileen Collins, and the second Shuttle mission of the year. Mission STS-93 marks the 26th flight of the orbiter Columbia and the 95th flight overall in NASA's Space Shuttle program. STS-93 is slated to last 4 days and 23 hours. Columbia returns to KSC's Shuttle Landing Facility at 11:31 p.m. on July 24, marking the shortest Shuttle mission since 1990.

Columbia will carry into space NASA's latest and greatest X-ray telescope, the Chandra X-ray Observatory. With Chandra, scientists around the world will study some of the most distant, powerful and dynamic objects in the universe. The new telescope is 20 to 50 times more sensitive than any previous X-ray telescope and is expected to unlock the secrets of supernovae, quasars, and black holes. Stowed in Columbia's payload bay, the combined Chandra/Inertial Upper Stage measures 57 feet long and weighs 50,162 pounds. Fully deployed with solar arrays extended, the observatory measures 45.3 feet long and 64 feet wide.

In addition to the primary payload, Columbia is also carrying several smaller payloads, including the Southwest Ultraviolet Imaging System. Stowed on Columbia's middeck, this system measures emissions in the UV spectrum that can not be observed on Earth.

Columbia was rolled out of Kennedy Space Center's Orbiter Processing Facility bay 1 on June 2 and then mated with the external tank and solid rocket boosters in the Vehicle Assembly Building. The Shuttle stack was transported to pad 39B on June 7.

The STS-93 crew consists of: Commander Eileen Collins, Pilot Jeff Ashby, Mission Specialists Steve Hawley, Catherine Coleman and French astronaut Michel Tognini. The crew is scheduled to arrive at KSC at about 7 a.m., Friday, July 16. Their activities at KSC prior to launch will include crew equipment fit checks, medical examinations and opportunities to fly in the Shuttle Training Aircraft.

(end of general release)

COUNTDOWN MILESTONES
*all times are Eastern

Launch - 4 Days (Friday, July 16)

- Prepare for the start of the STS-93 launch countdown
- Perform the call-to-stations (9:30 p.m.)
- All members of the launch team report to their respective consoles in Firing Room 1 in the Launch Control Center for the start of the countdown
- Countdown begins at the T-43 hour mark (10 p.m.)
- Begin final vehicle and facility close-outs for launch
- Review flight software stored in mass memory units and display systems
- Load backup flight system software into Columbia's general purpose computers

Launch - 3 Days (Saturday, July 17)

- Preparations to pressurize power reactant storage and distribution system (2 a.m.)
- Middeck and flight deck platform removal begins (6 a.m.)
- Begin preparations to load power reactant storage and distribution system (8 a.m.)
- Activate global positioning system and test navigational systems (10:30 a.m.)
- Columbia's payload bay doors closed for flight (11 a.m.)

Enter first planned built-in hold at T-27 hours for duration of four hours (2 p.m.)

- Clear launch pad of all non-essential personnel
- Perform test of the vehicle's pyrotechnic initiator controllers (3 p.m.)
- Open launch pad to personnel supporting PRSD load

Resume countdown (6 p.m.)

- Begin operations to load cryogenic reactants into Columbia's fuel cell storage tanks (6 p.m. - 2 a.m.)

L-2 Days (Sunday, July 18)

Enter eight-hour built-in hold at T-19 hours (2 a.m.)

- Begin cleaning and vacuuming Columbia's crew module (6 a.m.)
- Demate orbiter mid-body umbilical unit and retract into fixed service structure (9:30 a.m.)
- Resume orbiter and ground support equipment close-outs

Resume countdown (10 a.m.)

- Start final preparations of the Shuttle's main engines for propellant tanking and flight
- Begin Mission Specialist seat installation and cable routing verifications (1:30 p.m.)
- Close-out the tail service masts on the mobile launcher platform (5 p.m.)

Enter planned hold at T-14 hours for 14 hours, 46 minutes (6 p.m.)

- Begin startracker functional checks
- Activate orbiter's inertial measurement units (8:30 p.m.)
- Install film in numerous cameras on the launch pad
- Activate the orbiter's communications systems (11 p.m.)

Launch - 1 Day (Monday, July 19)

- Flight crew equipment late stow begins (12:30 a.m.)
- Fill pad sound suppression system water tank
- Safety personnel conduct debris walk down
- Payload Inertial Upper Stage system checks begin (3 a.m.)
- Move Rotating Service Structure (RSS) to the park position (4 a.m.)
- Perform orbiter ascent switch list in crew cabin
- Start fuel cell flow-through purge (8:10 a.m.)

Resume countdown (8:46 a.m.)

- Activate the orbiter's fuel cells
- Configure communications at Mission Control, Houston, for launch
- Clear the blast danger area of all non-essential personnel
- Switch Columbia's purge air to gaseous nitrogen (11:16 a.m.)
- Complete inertial measurement unit activation

Enter planned two-hour built-in hold at the T-6 hour mark (1:46 p.m.)

- Launch team verifies no violations of launch commit criteria prior to cryogenic loading of the external tank
- Clear pad of all personnel
- Chilldown of liquid propellant lines before external tank loading (3:16 p.m.)

Resume countdown (3:46 p.m.)

- Begin loading the external tank with about 500,000 gallons of cryogenic propellants (about 3:46 p.m.)
- Perform inertial measurement unit preflight calibration
- Align Merritt Island Launch Area (MILA) tracking antennas (5:16 p.m.)
- Close-out crew and Final Inspection Team proceed to Launch Pad 39B (6:30 p.m.)
- Complete filling the external tank with its flight load of liquid hydrogen and liquid oxygen propellants (about 6:46 p.m.)

Enter planned two-hour built-in hold at T-3 hours (6:46 p.m.)

- Astronaut support personnel conduct communication checks
- Activate navigational aids (7:16 p.m.)

Resume countdown at T-3 hours (8:46 p.m.)

- Perform open loop test with Eastern Range
- Crew departs Operations and Checkout Building for the pad (about 8:51 p.m.)
- Complete close-out preparations in the white room
- Check cockpit switch configurations

Flight crew begins entry into the orbiter (about 9:21 p.m.)
- Astronauts perform air-to-ground voice checks with Launch Control and Mission Control
- Close Columbia's crew hatch (about 10:36 p.m.)
- Perform hatch seal and cabin leak checks
- Complete white room close-out
- Close-out crew moves to fallback area

Enter planned 10-minute hold at T-20 minutes (11:26 p.m.)

- NASA Test Director conducts final launch team briefings
- Complete inertial measurement unit pre-flight alignments

Resume countdown (11:36 p.m.)

- Transition the orbiter's onboard computers to launch configuration
- Start fuel cell thermal conditioning
- Close orbiter cabin vent valves
- Transition backup flight system to launch configuration

Enter planned 40-minute hold at T-9 minutes (11:47 p.m.)

- Launch Director, Mission Management Team and NASA Test Director conduct final polls for go/no go to launch
- Launch window determination
- Inertial Upper Stage hold-fire enabled

Launch Day (July 20)

Resume countdown at T-9 minutes (12:27 a.m.)

- Start automatic ground launch sequencer (T-9:00 minutes)
- Retract orbiter crew access arm (T-7:30)
- Start mission recorders (T-6:15)
- Start Auxiliary Power Units (T-5:00)
- Arm SRB and ET range safety safe and arm devices (T-5:00)
- Start liquid oxygen drainback (T-4:55)
- Start orbiter aerosurface profile test (T-3:55)
- Start main engine gimbal profile test (T-3:30)
- Pressurize liquid oxygen tank (T-2:55)
- Begin retraction of the gaseous oxygen vent arm (T-2:55)
- Fuel cells to internal reactants (T-2:35)
- Pressurize liquid hydrogen tank (T-1:57)
- Deactivate SRB joint heaters (T-1:00)
- Orbiter transfers from ground to internal power (T-0:50 seconds)
- Ground Launch Sequencer go for auto sequence start (T-0:31 seconds)
- SRB gimbal profile (T-0:21 seconds)
- Ignition of three Space Shuttle main engines (T-0:6.6 seconds)
- SRB ignition and liftoff (T-0)

SUMMARY OF BUILT-IN HOLDS FOR STS-93			
T-TIME	**LENGTH OF HOLD**	**HOLD BEGINS**	**HOLD ENDS**

T-27 hours	4 hours	2 p.m. Sat.	6 p.m. Sat.
T-19 hours	8 hours	2 a.m. Sun.	10 a.m. Sun.
T-11 hours	14 hours, 46 minutes	6 p.m. Sun.	8:46 a.m. Mon.
T-6 hours	2 hours	1:46 p.m. Mon.	3:46 p.m. Mon.
T-3 hours	2 hours	6:46 p.m. Mon.	8:46 p.m. Mon.
T-20 minutes	10 minutes	11:26 p.m. Mon.	11:36 p.m. Mon.
T-9 minutes	40 minutes	11:47 p.m. Mon.	12:27 a.m. Tues.

CREW FOR MISSION STS-93	
POSITION	**NAME**
Commander (CDR)	Eileen Collins
Pilot (PLT)	Jeff Ashby
Mission Specialist (MS1)	Catherine Coleman
Mission Specialist (MS2)	Steven Hawley
Mission Specialist (MS3)	Michel Tognini

For automatic e-mail subscriptions to this daily Shuttle status report or KSC-originated press releases, send an Internet electronic mail message to domo@news.ksc.nasa.gov. In the body of the message (not the subject line) type the words "subscribe shuttle-status", or "subscribe ksc-press-release" (do not use quotation marks). The system will reply with a confirmation via e-mail of each subscription.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

July 14, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 60-99

HAMMER AWARD TO BE PRESENTED TO KSC AND 45TH SPACE WING

Reinventing a costly way of doing business will save taxpayers an estimated $557 million and has earned Kennedy Space Center and the 45th Space Wing one of Vice President Al Gore's Hammer Awards. Morley Winograd, director, National Partnership for Reinventing Government, will present the award at the KSC Visitor Complex, IMAX 2 Theater July 16 at 4 p.m.

This Hammer Award will recognize the accomplishments of a joint NASA and Air Force team that established the Joint Base Operations and Support Contract (J-BOSC) Source Evaluation Board (SEB). This team developed and implemented the acquisition strategy for establishing a single set of base operations and support service requirements for KSC, Cape Canaveral Air Station and Patrick Air Force Base. Eighteen different contractors, often with overlapping and duplicate responsibilities, previously performed these services. Chris Fairey and Ed Gormel, co-chairs of the J-BOSC SEB, will receive the award from Winograd on behalf of the team.

The Hammer Award is the Vice President's special recognition of teams of federal employees who have made significant contributions in support of the principles of the National Partnership for Reinventing Government. These principles are: putting customers first, cutting red tape, empowering employees, and getting back to basics.

As a result of the J-BOSC SEB's initiatives, substantial savings will be available to reinvest in capital improvements at KSC and CCAS to attract new commercial space activities. These initiatives also paved the way for the Air Force and NASA to focus on their core missions of research and development and launch operations.

Daniel Goldin, NASA Administrator and Gen. Richard B. Myers, commander, Air Force Space Command will make remarks during the ceremony.

Note to editors: Media representatives interested in covering this event should be at the IMAX 2 Theater at the KSC Visitor Complex by 3:30 p.m. on July 16. After the event, transportation will be provided to media who also plan to attend the Apollo 11 30th Anniversary 5:30 p.m. news conference and ceremony at the Apollo/Saturn V Facility.

the subject line) type the words "subscribe shuttle-status", or "subscribe ksc-press-release" (do not use quotation marks). The system will reply with a confirmation via e-mail of each subscription.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

July 14, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 61-99

Notice to Editors/News Directors:
MISSION STS-93 EVENTS, NEWS CENTER OPERATING HOURS SET

News conferences, events and operating hours for KSC's News Center have been set for the July 20 launch of the Space Shuttle Columbia on Mission STS-93, the 95th launch in the Shuttle program. The conferences and events will be carried live on NASA Television unless otherwise noted, and originate from the KSC Press Site.

The five STS-93 crew members are scheduled to arrive at KSC Friday, July 16, at about 7 a.m. EDT. News media representatives planning to cover the event must be at the News Center by 6 a.m. (in the event of a possible early crew arrival) for transportation to the Shuttle Landing Facility.

News media representatives with proper authorization may obtain STS-93 mission credentials at the Pass and Identification Building on State Road 3 (south of KSC) on Merritt Island during published times. (Credential and badging hours are listed below.)

In addition to daily 9 a.m. countdown status briefings, the pre-launch press conference will be held two days before launch and a Chandra X-ray Observatory science briefing will be held the day prior to liftoff.

-- end of general release --

STS-93 BRIEFING & EVENTS SCHEDULE *(all times are EDT)*
(All briefings are held inside the KSC Press Site auditorium and will be carried live on NASA TV unless otherwise noted)

L-4 Days - Friday, July 16

7 a.m. Friday, July 16 ----- *STS-93 Flight Crew Arrival (Live on NASA TV)*

(Launch countdown begins at 10 p.m.)

L-3 Days - Saturday, July 17

9 a.m. ------ *Countdown Status Briefing*

- Doug Lyons, NASA Test Director
- Scott Higginbotham, STS-93 Payload Manager
- Ed Priselac, Shuttle Weather Officer

L-2 Days - Sunday, July 18

9 a.m. *------ Countdown Status Briefing*

- Steve Altemus, NASA Test Director
- Scott Higginbotham, STS-93 Payload Manager
- Ed Priselac, Shuttle Weather Officer

4 p.m. *----- Pre-launch News Conference*

- Ron Dittemore, Shuttle Program Manager, JSC
- Dave King, Director of Shuttle Operations, NASA, Kennedy Space Center
- Dr. Antonio Guell, CNES
- Captain Clif Stargardt, Staff Meteorologist, 45th Weather Squadron, USAF

L-1 Day - Monday, July 19

9 a.m. *------ Countdown Status Briefing*

- Grant Cates, Shuttle Columbia Flow Director
- Scott Higginbotham, STS-93 Payload Manager
- Ed Priselac, Shuttle Weather Officer

9:30 a.m. *----- Chandra Science Briefing*

- Dr. Ed Weiler, Associate Administrator for Space Science
- Dr. Alan Bunner, Chandra Program Scientist
- Professor Michael Turner, University of Chicago

***1:15 a.m.** --- Media depart for tour of Shuttle Radar Topography Mission on STS-99 at the Space Station Processing Facility.

(Tanking begins at about 3:46 p.m. Monday)

7:30 p.m. *----- NASA Television live launch programming begins*

Launch Day Crew activities:
7 p.m. (Monday, July 19) ---------- Crew wake up
**7:41 p.m. ------- Breakfast (Crew Photo)*
8:11 p.m. ----- Weather briefing
**8:30 p.m. ---- Suit up photo*
**8:51 p.m. ---- Walkout*
**9:21 p.m. ---- Arrive at pad*
**10:36 p.m. ----- Close hatch*
**12:36 a.m. (Tuesday, July 20) ----- Launch of Columbia*
(Carried live on NASA TV)*

Launch + 1 hour *----- Post-launch Press Conference*

- Donald R. McMonagle, Manager, Launch Integration for the Space Shuttle Program
- Ralph Roe, KSC Launch Director

KSC News Center office hours for STS-93
(Times may be adjusted in real time depending on mission events and timelines.)

Friday, July 16 *(Launch minus 4 days)* ----- 5 a.m. - 10 p.m.
Saturday, July 17 *(Launch minus 3 days)* ----- 8 a.m. - 4:30 p.m.
Sunday, July 18 *(Launch minus 2 days)* ----- 8 a.m. - 6 p.m.
Monday, July 19 *(Launch minus 1 day)* ----- 5 a.m. - round-the-clock
Tuesday, July 20 *(Launch Day) Flight day 1* ----- round-the-clock - 4:30 p.m.
Wednesday, July 21 - *Flight day 2* ----- 8 a.m. - 4:30 p.m.
Thursday, July 22 - *Flight day 3* ----- 8 a.m. - 4:30 p.m.
Friday, July 23 - *Flight day 4* ----- 8 a.m. - 9:30 p.m.
Saturday, July 24 *(Landing day) Flight day 5* - TBD

News media may obtain STS-93 mission credentials at the Pass and Identification Building at Gate 2 on State Road 3, Merritt Island, during the following times:

Pass and Identification Hours

Sunday, July 18 --------- 8 a.m. - 4:30 p.m.
Monday, July 19 -------- 8 a.m. - 11:30 p.m.

News media with annual Shuttle credentials are reminded to sign the logbook at the query counter in the News Center.

NEWS MEDIA ARE REQUIRED TO BE UNDER PUBLIC AFFAIRS ESCORT AT ALL TIMES WHILE AT KSC EXCEPT WHEN DRIVING TO THE NEWS CENTER OR THE COMPLEX 39 CAFETERIA.

NEWS MEDIA ARE ALLOWED AT THE PRESS SITE ONLY WHEN PUBLIC AFFAIRS PERSONNEL ARE ON DUTY AND THE NASA NEWS CENTER IS OPEN.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

July 15, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 62-99

SHARP STUDENTS CONTINUE SUMMER WORK AT KENNEDY SPACE CENTER

This summer, Kennedy Space Center continues its annual participation in the NASA-wide sponsorship of the Summer High School Apprenticeship Research Program (SHARP).

Each year NASA sponsors a variety of educational programs and opportunities for teachers and students of all ages. One such program, SHARP, is a mentor-based, 8-week program with NASA scientists, engineers and other research specialist serving as professional role models. Initiated in 1980, SHARP was specifically designed to attract and increase underrepresented students' participation and success rates in mathematics and science courses. Ultimately, the program hopes to encourage these students to pursue career paths that increase the pool of underrepresented science, mathematics, engineering and technology professionals.

About 200 SHARP apprentices are selected from a nationwide pool of 1400 high school juniors and seniors. The selected students are placed at one of nine NASA field installations throughout the United States. To be eligible for SHARP, students must have an overall 3.0 grade point average; demonstrate a strong interest in and aptitude for a career in mathematics, engineering, or the sciences; be a permanent resident; attend school within a 50-mile radius of the NASA Field Installation; be available on a full-time basis (40 hours per week) for the entire duration of the program; possess teacher recommendations; and write a 300-word essay.

KSC currently has 26 apprentices. They work on a wide variety of research projects including web page design, finding more efficient means of repairing of orbiter tiles, wildlife ecology, aquatics, soil composition and transport engineering. In addition to research, apprentices participate in enrichment activities including portfolio building, public speaking, and college preparatory seminars.

The SHARP experience culminates with a final research paper and presentation. Apprentices' reports provide detailed records of their research projects and the presentations give short synopses of their projects and experiences. The presentations will be given on July 30, Universe Theater, Kennedy Space Center Visitors Complex. For more information, contact NASA K-12 Education Services at (407) 867-4444.

the subject line) type the words "subscribe shuttle-status", or "subscribe ksc-press-release" (do not use quotation marks). The system will reply with a confirmation via e-mail of each subscription.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

July 15, 1999
KSC Contact: George H. Diller
KSC Release No. 63-99

Note to Editors/News Directors:
MEDIA OPPORTUNITY FOR SRTM SET FOR MONDAY, JULY 19

The payload for the Shuttle Radar Topography Mission (SRTM), to be flown aboard Space Shuttle Endeavour on STS-99 in mid-September, will be the subject of a photo and interview opportunity on Monday, July 19.

Once on orbit aboard Endeavour, the SRTM payload will deploy a 200-foot long mast with C-band and X-band antennas at its tip. Because of the size of SRTM, it is the only major payload in Endeavour's payload bay. Using the Spaceborne Imaging Radar (SIR-C) and X-Band Synthetic Aperture Radar (X-SAR), the SRTM will collect data that will be used to generate a three-dimensional topographic map. It will cover 80 percent of Earth's land surface during the 11-day mission, mapping with a resolution of 100 feet.

On Monday, July 19, SRTM will be hoisted from its test stand in the Space Station Processing Facility (SSPF) and lowered into the payload canister in preparation for transportation to OPF Bay 1 and installation into Endeavour. Media participating in this event will witness the activity from an excellent vantage point within the SSPF near the radar payload. Spokespersons from the SRTM project will be on hand for interviews and to answer questions.

Media desiring to attend should be at the NASA News Center by 11:15 a.m. on Monday, July 19. A routine search of camera bags by KSC personnel should be anticipated. While clean room attire is not required for this event, all persons going into the SSPF will be required to wear long pants and closed- toe shoes. No shorts or skirts can be permitted. No food, tobacco, matches or lighters, graphite pencils or pocket knives are allowed. Electronic flash photography is permitted. The lighting in the facility is mercury vapor.

STS-93 press credentials will be used for this event.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

July 18, 1999
KSC Contact: George H. Diller
KSC Release No. 64-99

Note to Editors/News Directors:
TIME CHANGED FOR SRTM MEDIA OPPORTUNITY ON MONDAY, JULY 19

For operational reasons associated with the payload, the time for the photo and interview opportunity for the Shuttle Radar Topography Mission (SRTM) on Monday, July 19 has changed from 11:15 a.m. to 1:15 p.m.

SRTM is to be flown aboard Space Shuttle Endeavour on STS-99 in mid-September. Once on orbit, the SRTM payload will deploy a 200-foot long mast with C-band and X-band antennas at its tip. Because of the size of SRTM, it is the only major payload in Endeavour's payload bay. Using the Spaceborne Imaging Radar (SIR-C) and X-Band Synthetic Aperture Radar (X-SAR), the SRTM will collect data that will be used to generate a three-dimensional topographic map. It will cover 80 percent of Earth's land surface during the 11-day mission, mapping with a resolution of 100 feet.

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Media desiring to attend should be at the NASA News Center at 1:15 p.m. on Monday, July 19. A routine search of camera bags by KSC personnel should be anticipated. While clean room attire is not required for this event, all persons going into the SSPF will be required to wear long pants and closed- toe shoes. No shorts or skirts can be permitted. No food, tobacco, matches or lighters, graphite pencils or pocket knives are allowed. Electronic flash photography is permitted. The lighting in the facility is mercury vapor.

STS-93 press credentials will be used for this event.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

July 19, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 65-99

NASA COMMISSIONS JUDY COLLINS TO WRITE A SONG IN HONOR OF EILEEN COLLINS THROUGH THE NASA ART PROGRAM

Judy Collins has honored Eileen Collins, first woman to command a Space Shuttle, with a song commissioned by NASA through the NASA Art Program. Judy Collins will perform the song, "Beyond the Sky," at a pre-flight briefing on Monday, July 19, 1999 at 10:30 p.m. and will be on hand for the VIP viewing of the launch that evening. It is also understood that the song written especially for the occasion will be broadcast at the site prior to the launch. The launch of STS-93 coincides with the 30th anniversary of the Apollo Moon landing.

For additional information on the Shuttle-related events or the music, please contact:

- Jim Murtha/Gurtman and Murtha, 212/967-7350 or 516/587-6125
- Katherine DePaul/Wildflower Records, 212/749-7221
- Bert Ulrich/NASA, 202/358-1713

Beyond the Sky
Words and Music by Judy Collins - The Wildflower Company/ASCAP

Once there was a girl with a dream in her heart
Wild as the wind was her hope
In those far off days she could dream all she would
No one but her heart believed her hope
All she could do was to hold to her dream
Catching every rainbow's light
Praying for the miracle to come to pass
Even on the darkest night

That she would fly beyond the sky
Beyond the stars beyond the heavens
Beyond the dawn she'd carry on
Until her dreams had all come true

Once there was a woman with stars in her eyes
Flying on the wings of her dreams
She had come so far it was hard to believe
Changed the world from what it seemed
Equal to the ones who had claimed the sky
Now she flew with them beneath the sun

But she dared a dream beyond all dreams
She would take the helm and be the one

And she would fly beyond the sky
Beyond the stars beyond the heavens
Beyond the dawn she'll carry on
Until her dreams have all come true

She had led the way beyond darkness
For other dreamers who would dare the sky
She has led us to believe in dreaming
Given us the hope that we can try

Now in the grace of her dance of delight
Shining in her destiny
Here is the promise for all our hopes
Telling us we can be free

And we will fly beyond the sky
Beyond the stars beyond the heavens
Beyond the dawn we'll carry on
Until our dreams have all come true

To those who fly - we sing to you

Into the sky

Beyond the stars

We'll reach our dreams

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

July 27, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 66-99

Note to Editors:
COLUMBIA SCHEDULED TO LAND AT KSC COMPLETING MISSION STS-93

The orbiter Columbia is scheduled to land at Kennedy Space Center on Tuesday, July 27, at 11:20 p.m. EDT completing its 5-day STS-93 mission that was launched from KSC on the early morning of July 23, 1999.

Landing at KSC's Shuttle Landing Facility (SLF) is slated to occur on orbit 80 at mission elapsed time 4 days, 22 hours, 49 minutes. Deorbit burn will occur at about 10:19 p.m. EDT.

Two KSC landing opportunities Tuesday night are: 11:20 p.m. and 12:55 a.m. (Wednesday).

Managers decided not to call up the back-up landing location at Edwards Air Force Base (EAFB), CA, for a possible landing there on Tuesday though at least two landing opportunities exist there. If managers must keep Columbia in orbit an additional day, two landing opportunities are available Wednesday evening at KSC and two at EAFB.

KSC Wednesday night landing times are: 11:17 p.m. and 12:51 a.m. (Thursday) EDT.

EAFB Wednesday night landing times are: 12:43 a.m. (Thursday) and 2:18 a.m. (Thursday) EDT.

This landing of Columbia will mark the 48th landing at KSC in the history of Space Shuttle flight. It will be the 19th consecutive landing at KSC and the 26th in the last 27 shuttle flights. This landing also will mark the 12th nighttime landing of the Space Shuttle, the 7th nighttime landing at KSC. Columbia is currently on the 95th Space Shuttle mission in the history of the program.

A press conference with select members of the crew is currently scheduled to occur at about 6 a.m. Wednesday, July 28. The time and date of this event is subject to change and members of the media should remain in touch with the KSC press site for further details. The event will be held in the KSC Press Site auditorium and carried live on NASA TV. Following the briefing, the entire crew will depart for Houston, TX.

SLF and KSC Ground Operations

The Shuttle Landing Facility was built in 1975. It is 300 feet wide and 15,000 feet long with 1,000-foot overruns at each end. The strip runs northwest to southeast and is located about 3 miles northwest of the 525-foot tall Vehicle Assembly Building.

Once the orbiter is on the ground, safing operations will commence and the flight crew will prepare the vehicle for post-landing operations. The Crew Transport Vehicle (CTV) will be used to assist the crew, allowing them to leave the vehicle and remove their launch and re-entry suits easier and quicker.

The CTV and other KSC landing convoy operations have been "on-call" since the launch of Columbia July 23. The primary functions of the Space Shuttle recovery convoy are to provide immediate service to the orbiter after landing, assist crew egress, and prepare the orbiter for towing to the Orbiter Processing Facility.

Convoy vehicles are stationed at the SLF's mid-point. About two hours prior to landing, convoy personnel will don SCAPE suits, or Self-Contained Atmospheric Protective Ensemble, and communications checks are made. A warming-up of coolant and purge equipment is conducted and nearly two dozen convoy vehicles are positioned to move onto the runway as quickly and as safely as possible once the orbiter coasts to a stop. When the vehicle is deemed safe of all potential explosive hazards and toxic gases, the purge and coolant umbilical access vehicles move into position at the rear of the orbiter.

Following purge and coolant operations, flight crew egress preparations will begin and the CTV will be moved into position at the crew access hatch located on the orbiter's port side. A physician will board the Shuttle and conduct a brief preliminary examination of the astronauts. The crew will then make preparations to leave the vehicle.

Following departure from the SLF, the crew will be taken to their quarters in the O&C Building, meet with their families and undergo physical examinations. The crew is scheduled to depart for JSC Wednesday morning.

If Columbia lands at Edwards, an augmented KSC convoy team will be on-site to safe the vehicle, disembark the crew and move the orbiter to the Mate/Demate Device. The turnaround team will be deployed to Edwards by charter aircraft on landing day.

About 3½ hours after Columbia lands at KSC, the orbiter will be towed to Orbiter Processing Facility bay 3 for post-flight deservicing. Operations in the OPF will be made to prepare Columbia for its ferry flight to Palmdale, CA, for a period of extended modifications and structural inspections. Columbia is scheduled to leave KSC for Palmdale in late September 1999. Following Columbia's down time, its next scheduled mission is STS-107 targeted for launch in early 2001.

-- end --

<u>NOTICE TO EDITORS</u> The KSC press site will be open Tuesday, July 27, from 8 a.m. around to clock until 4:30 p.m. Wednesday. Media wishing to view Columbia's landing should be at the KSC press site prior to 10 p.m. Tuesday for transport to the SLF.

Additional specific information regarding landing photo opportunities, post-landing press conferences and KSC News Center operational hours is available

at the KSC News Center.

For automatic e-mail subscriptions to this daily Shuttle status report or KSC-originated press releases, send an Internet electronic mail message to domo@news.ksc.nasa.gov. In the body of the message (not the subject line) type the words "subscribe shuttle-status", or "subscribe ksc-press-release" (do not use quotation marks). The system will reply with a confirmation via e-mail of each subscription.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

July 29, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 67-99

ARBUTHNOT NAMED DIRECTOR, ADMINISTRATION OFFICE AT KSC

Richard E. Arbuthnot was recently named director, Administration Office, at Kennedy Space Center. He was appointed to this career Senior Executive Service position, effective July 18, 1999.

Prior to the appointment, Arbuthnot served as acting director of the Administration Office at KSC. In this position, he provides executive leadership and centralized management of civil service human resources programs, workforce management and planning and industry relations.

Arbuthnot came to KSC in February 1999 from the John C. Stennis Space Center, in Pearl River, Miss., where he served as director, Human Resources and Management Services. Since joining NASA in 1985, he has served in several positions across the Agency.

He worked at Johnson Space Center as a Human Resources personnel management specialist until 1989 and then as special assistant, Legislative Affairs, to the Comptroller until 1990. From 1990 to 1991, he was the NASA liaison to the chairman of the U.S. Senate Appropriations Committee. From 1991 to 1993, he was executive officer to the NASA associate administrator for Human Resources and Education. He joined the John C. Stennis Space Center in 1993.

Arbuthnot earned a Bachelor of Science degree from Wayne State College, Wayne, Neb., in 1981 and a Master of Public Administration degree from Kansas State University, Monhattan, Kan., in 1985.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

August 2, 1999
KSC Contact: George H. Diller
KSC Release No. 68-99

"RAFFAELLO" MULTI-PURPOSE LOGISTICS MODULE TO ARRIVE AT KSC

The Italian Space Agency's "Raffaello" Multi-Purpose Logistics Module (MPLM), the second of three for the International Space Station, is scheduled to arrive at Kennedy Space Center late Wednesday, Aug. 4. It is to be transported to the United States by a special Airbus "Beluga" air cargo plane from the factory of Alenia Aerospazio in Turin, Italy.

The Raffaello MPLM, one of Italy's major contributions to the International Space Station program, is a reusable logistics carrier. These logistics modules are the primary delivery system used to resupply and return station cargo requiring a pressurized environment. The cylindrical module is approximately 21 feet long, 15 feet in diameter and weighs almost 4.5 tons excluding up to 20,000 pounds of contents.

Launched in the Space Shuttle's payload bay, it will contain supplies, science experiments, spare parts and components for the International Space Station. Once on orbit, it will be removed from the payload bay and docked to the space station using the remote manipulator arm of either the Shuttle or the station. During each MPLM mission, supplies and scientific experiments are exchanged for items to be returned to earth including completed experiments, equipment for repair, or trash and recyclables.

The Raffaello and Leonardo logistics modules are processed by NASA at KSC's Space Station Processing Facility (SSPF) with engineering support from the Italian Space Agency, Alenia Aerospazio and Boeing. Among the activities for the payload test team to prepare the module for launch are integrated electrical tests with other station elements in the SSPF, leak tests, electrical and software compatibility tests with the Space Shuttle using the Cargo Integrated Test Equipment (CITE), and an Interface Verification Test (IVT) once the module is installed in the Space Shuttle's payload bay at the launch pad.

The most significant mechanical task to be performed on Raffaello in the SSPF is the installation and outfitting of the racks for carrying the various experiments and cargo. Raffaello provides interfaces for up to 16 racks, five of which also furnish power, data and fluid support to a refrigerator freezer. The racks will be installed into the module using an efficient piece of robotic equipment called the "Rack Insertion Device (RID)." The RID was developed by Kennedy Space Center engineers for fast and easy installation and removal of the racks for rapid turnaround

of the logistics module between missions.

The first of the three MPLM's, "Leonardo," arrived at KSC on Aug. 3, 1998. "Donatello," the third module, is planned for arrival in 2001. Raffaello will be launched aboard Space Shuttle Endeavour on mission STS-100 currently planned for July, 2000.

NOTE TO EDITORS/NEWS DIRECTORS: The day after arrival, media are invited to watch the offloading of Raffaello from the "Beluga" Super Transporter and then tour this unusual cargo aircraft. Nicknamed for its resemblance to the rare white whale, the Beluga is the largest cargo aircraft in the world in terms of volume. The Beluga is owned by Europe's Airbus Industrie and operated by its Airbus Transport International division.

During Raffaello's offloading, NASA personnel will be available to discuss the arrival at KSC of the latest multi-purpose logistics module. Personnel from Airbus will discuss the Beluga aircraft.

Media wishing to attend this event should be at the NASA News Center at 9 a.m. on Thursday, Aug. 5 for transport to the Shuttle Landing Facility.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

August 12, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 69-99

PAYLOAD FOR THIRD HUBBLE SERVICING MISSION ARRIVES AT KSC

The payload flight hardware for the Third Hubble Space Telescope Servicing Mission (SM-3A) arrived today at Kennedy Space Center aboard a C-5 air cargo plane. It was shipped from NASA's Goddard Space Flight Center in Greenbelt, MD.

After offloading from the C-5, the shipping container was taken to the Payload Hazardous Servicing Facility (PHSF) located in the KSC Industrial Area. There final integration of the payload elements will occur and each will be fully tested.

The Third Servicing Mission (SM-3A) is a "call-up" mission which is being planned due to the need to replace portions of the spacecraft's pointing system, the gyros, which have begun to fail. Hubble is operating normally and continuing to conduct its scientific observations, but only three of its six gyroscopes--which allow the telescope to point at stars, galaxies and planets--are working properly. The telescope needs at least three gyroscopes to operate properly.

In addition to replacing gyroscopes, the crew will replace a Fine Guidance Sensor and install a new enhanced computer, replacing an older model. A sold state digital recorder will replace an older data tape recorder. Also, a Battery Voltage/Temperature Improvement Kit will be installed to protect the spacecraft batteries form overcharging and overheating when the telescope goes into a safe mode. A new transmitter will replace a failed spare currently aboard the spacecraft. New thermal insulation will replace insulation on the telescope that has degraded.

The STS-103 flight crew will come to KSC to participate in the Crew Equipment Interface Test (CEIT) several weeks prior to launch and will be involved in a flight readiness evaluation of the payload elements including the flight support equipment needed for the three planned spacewalks.

The payload is currently scheduled to be transported to Launch Pad 39-B for installation aboard Space Shuttle Discovery at the end of this month. Launch of Discovery on mission STS-103 is currently targeted for Oct. 14 from Pad 39-B at the Kennedy Space Center. These dates will be reviewed pending the establishment of the launch date of Endeavour on mission STS-99, currently under review and set to occur prior to STS-103.

The Hubble Space Telescope was first placed into orbiter aboard the Space Shuttle Discovery on mission STS-31 in April 1990.

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NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

August 24, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 70-99

Photo No. KSC-98PC-1043 (aerial view of VAB high bays 2 and 4)

NASA CONTRACT PAVES THE WAY FOR VAB "SAFE HAVEN" MODIFICATIONS

In a move to better safeguard Space Shuttle assemblies and keep assembly procedures on track, the Vehicle Assembly Building (VAB) will be outfitted with a third stacking area. The new area, in high bay 2, will allow NASA to preassemble stacks and still have room in the VAB to pull a Shuttle back from the pad if severe weather threatens.

High bay 2 - on the southwest side of the VAB - will be modified for stacking and a buried portion of the Apollo-era crawlerway leading to the high bay restored. Potential rollouts of the Space Shuttle to the launch pad from high bay 2 will involve making a turn around the north side of the VAB in contrast to the straight rollouts from high bays 1 and 3, on the east side of the VAB facing the launch pads.

The "Safe Haven" construction project includes a $2.56 million contract awarded to Rush Construction Corporation of Titusville, Fla., on Aug. 4, 1999, for external VAB modifications. External modifications include the restoration of a buried portion of the Apollo-era crawlerway that extends into high bay 2.

United Space Alliance, NASA's Shuttle operations contractor, will renovate the interiors of high bays 2 and 4 in a separate effort valued at about $1.7 million. Once complete, high bay 2 will be able to store a fully assembled Space Shuttle and high bay 4 will accommodate horizontal orbiter storage.

Previously only VAB high bays 1 and 3 were equipped for a full Shuttle stack: two solid rocket boosters, an external tank, and a Shuttle orbiter atop the Mobile Launch Platform (MLP). High bays 2 and 4 have been used primarily for external tank checkout and to store booster segments and ground support equipment. Following the modifications, ground support equipment storage will be relocated to the low bay area.

"The primary goal of the Safe Haven construction project is to strengthen our readiness for hurricane season by expanding the VAB's storage capacity," said Don McMonagle, Manager, Space Shuttle Program Launch Integration at KSC. "The flexibility we gain will allow us to accommodate unplanned flight hardware moves and minimize their impact on the Shuttle manifest."

Every year from June through November, KSC institutes a Safe Haven plan

designed to protect Space Shuttles during hurricane season. When a Shuttle is at the launch pad and winds of 69 mph or greater are forecast, a decision can be made to roll the Shuttle back into the VAB for protection. The VAB can withstand winds up to 125 mph.

"Fortunately, after 95 Shuttle flights we have only rolled the Shuttle back to the VAB 13 times, and only four of those were because of a severe weather threat," explained Dave King, KSC's Director of Shuttle Processing. "As a precaution though, we have to stop booster buildup operations for downstream flights to ensure quick access to one of two available high bays during the volatile hurricane season. Protecting the nation's investment in the Space Shuttle is a high priority."

"Our current configuration provides adequate protection for the Space Shuttle," King said, "but it limits our level of productivity and threatens the Shuttle manifest. A third high bay with full storage capacity allows us to proceed with downstream booster operations during hurricane season and maximizes the utilization of our versatile Vehicle Assembly Building."

Planning for the project began in July of 1998. Construction efforts begin this month and will conclude in May 2000. Construction crews last performed major modifications to the VAB in the late 1970s when NASA moved from the Apollo era into the Space Shuttle era.

Built between 1963 and 1966, the VAB is 525 feet tall, 716 feet long and 518 feet wide. One of the largest buildings in the world, it measures 129,482,000 cubic feet. Its footprint covers 8 acres in KSC's Launch Complex 39.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

August 24, 1999
KSC Contact: Joel Wells
KSC Release No. 71-99

KSC DELIVERS X-33 PROPELLANT LOADING EQUIPMENT TO CALIFORNIA

A car needs gas to run and there must be a pump, hose and nozzle to fill its gas tank. In the case of the X-33 advanced technology demonstrator, a complex system of panels, valves and hoses, known as umbilicals, provide the means to load X-33 with super-cold propellant. A team of Kennedy Space Center experts developed X-33's complex umbilical system.

The KSC team designed, fabricated and tested the X-33 umbilical system and delivered the finished products to Lockheed Martin in July. Under construction at Lockheed Martin Skunk Works in Palmdale, CA, X-33 is a half-scale prototype of the planned operational reusable launch vehicle (RLV) dubbed VentureStar.

X-33 begins test flights next year from Edwards Air Force Base, CA. Just prior to launch, X-33 will be loaded with about 70,000 gallons of liquid hydrogen and liquid oxygen. In a split second, as X-33 rises from the launch mount, the ground umbilicals that transfer the propellant into the vehicle will retract from the liquid oxygen and liquid hydrogen interface panels and into the protective umbilical tunnels.

"We're excited about our recent contributions to the X-33 development process," said Warren Wiley, KSC's RLV programs manager. "Earlier this year we delivered the X-33 vehicle positioning system to the launch site and now the umbilical system has been installed on the vehicle and at the launch site. These success stories showcase KSC's 30 years of experience in launch vehicle handling and ground processing."

KSC engineers began development of the umbilical system in September of 1996 and completed testing this year in July. The two aluminum interface panels are each 3 feet wide and 4 feet long and have already been installed at the tail of the vehicle. A complex system of latches and actuators ensure all connections are properly aligned and sealed during fueling, and then quickly retract allowing liftoff. The sophisticated system is protected from the harsh launch environment by two 15-foot tall carbon steel tunnels, which are now part of the launch site landscape.

"Of the umbilical test programs I've been involved with, this was the smoothest. It demonstrated KSC's commitment to team work and quality workmanship," explained Alan Littlefield, NASA umbilical engineer. "It is rewarding to work on a new program like X-33 and to apply the expertise we've gained from the Shuttle

program."

X-33 and its support systems are being developed through a cooperative agreement between Lockheed Martin and NASA. This approach has allowed Lockheed Martin to assemble a unique industry/government team that includes KSC engineers who have traditionally focused on processing the Shuttle.

NASA and Lockheed Martin engineers have labored hand-in-hand with United Space Alliance workers at KSC taking advantage of an immense launch support infrastructure. Lockheed Martin initiates developmental efforts like this one through individual task agreements with NASA and contractually with industry partners.

The X-33 is intended to prove the cutting-edge technologies required for a full-scale RLV such as Lockheed Martin's VentureStar, which is planned for development after the turn of the century. The X-33 is scheduled to make as many as 15 test flights from Edwards Air Force Base, CA, to Dugway Proving Ground, UT, and Malmstrom Air Force Base, MT. Although suborbital, the X-33 will fly high enough and fast enough to encounter conditions similar to those experienced on an orbital flight path to fully prove its systems and performance.

NOTE TO EDITORS: Video and still photos of the X-33 umbilicals being fabricated and tested at KSC are available at the KSC Press Site and digital images are available at www.ksc.nasa.gov under publisher's photo corner.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

September 8, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 72-99

DATE SET FOR SECOND ANNUAL PARTNERS IN EDUCATION AND RESEARCH CONFERENCE

Kennedy Space Center is offering educators and members of industry the opportunity to learn more about emerging technologies at the nation's spaceport through an educational conference Oct. 5-7, 1999.

The 2nd Annual Partners in Education and Research Conference, to be held at the Radisson Resort in Cape Canaveral, is designed not only to inform participants, but to help NASA to identify research experts for future partnerships. In addition, NASA is seeking to enlist the educational community in NASA's efforts to inspire students through space and technology.

Faculty and industry representatives were invited to submit a brief abstract of their research or education activities by Aug. 27. Individuals selected as panelists will have their abstracts published as part of the conference materials.

Many of the 200 attendees last year said the highlight of the conference was the opportunity to network with NASA personnel and other participants to gain a better understanding of activities related to the space program.

"This is our 2nd annual partners conference," said James L. Jennings, KSC's deputy director for Business Operations. "The first one was an overwhelming success and provided an opportunity for leaders from education, business, and government to discuss important issues relative to the technology, education and the space program. This year we expect an even greater opportunity for that interaction."

The two-day conference will include both technical and education sessions with topics including "Spaceport Technology – New Systems and Processes," "A Demonstration of Models for Spaceport Architecture and Operations," "Curriculum Design Using the Internet" and "Using Technology for Education."

Among the guest speakers planning to attend the conference are:

Dr. Edward Weiler, NASA's Associate Administrator for Space Science. Dr. Weiler is the head of NASA's space science efforts and has served as the Chief Scientist for the Hubble Space Telescope.

Norman Haynes, Mars Surveyor Program Manager, Jet Propulsion Laboratory. Mr. Haynes has an extensive background in interplanetary exploration.

Donald McMonagle, Manager, Launch Integration for the Space Shuttle Program at KSC. The former astronaut will discuss his flight activities from three Space Shuttle missions.

The registration fee for faculty and industry members is $125 for the full conference or $75 for Wednesday sessions and $50 for Thursday sessions. The fee for student participants is $75 for the full conference or $50 for Wednesday and $25 for Thursday. Registrations will be accepted on a first come, first serve basis. Registration deadline is Sept. 17.

Additional information, updates and registration materials are available on the conference website at http://www-pao.ksc.nasa.gov/kscpao/univ/programs/programs.htm or contact Gregg Buckingham at 407-867-7952.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

September 20, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 73-99

RIBBON CUTTING CEREMONY FOR NASA TECHNICAL RECORDS CENTER

NASA and Boeing are celebrating the opening of a new NASA Technical Records Center in a ribbon-cutting ceremony on Tuesday, Sept. 21, at 10:30 a.m. The new facility, completed in June, solved several space issues for NASA and Boeing through an innovative agreement and excellent teamwork. Boeing gained the space they needed to support their new Delta IV program and NASA gained a new records storage site. Center Director Roy Bridges and other officials will be attending the ceremony.

"The construction of this 14,000 square foot facility is an excellent example of a successful 'win-win' solution that benefits Boeing, NASA and several other contractors," said Bridges. "And it has advantages over the previous site, such as being more accessible for KSC employees, and having the capability to expand. I am pleased that we could work together with Boeing in solving both our needs."

The need for a new records facility surfaced when the Air Force awarded a contract to the Boeing Company for the Delta IV/Evolved Expendable Launch Vehicle (EELV). Boeing then required use of the Launch Complex 37 (LC 37) blockhouse that had served as NASA's storage site for technical records since the mid-1980s. When no suitable existing site could be found for NASA to relocate to, Boeing agreed to provide a suitable replacement facility and to relocate the NASA records. NASA/KSC then agreed to transfer the LC-37 blockhouse (Building 33000) to the 45th Space Wing of the Air Force to support Boeing's Delta IV/EELV contract.

Boeing completed the 14,110-square-foot NASA Technical Records in record time. By late June they began moving records and personnel into the new facility. The Building is on the southern perimeter of the NASA Education and Training Center on 3rd Street and B Avenue in the KSC Industrial Area.

Along with Boeing and NASA, other organizations that will utilize the center are United Space Alliance/Troutman Technical Services; Space Gateway Support/InDyne Inc. (SGS/IDI); and the Defense Contract Audit Agency (DCAA).

The new NASA Technical Records Center has several advantages over the former site. The building not only is larger than the blockhouse, but also has improved lighting and safety factors, and the location makes it much more accessible for customer use. Because it is located within the KSC Industrial Area, personnel no longer have to drive 20 miles each way to pick up or deliver drawings, nor does it

have to be evacuated during manned and unmanned launches. The center is more efficiently arranged for storage and is designed to enable future expansion.

NOTE TO EDITORS: Media interested in attending the ribbon cutting should be at the KSC Press Site by 9:30 a.m. on Sept. 21 for transport to the facility.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

September 23, 1999
KSC Contact: Joel Wells
KSC Release No. 74-99

COLUMBIA SCHEDULED TO DEPART KSC FOR MAJOR MODIFICATIONS IN PALMDALE, CA.

The orbiter Columbia, veteran of 26 Space Shuttle flights, is slated to depart Kennedy Space Center, FL, on Friday, Sept. 24, headed for Palmdale, CA. The oldest of four orbiters in NASA's fleet will undergo extensive inspections and modifications in Boeing's Orbiter Assembly Facility during a nine-month orbiter maintenance down period (OMDP).

This is Columbia's second OMDP, an action that periodically removes each of NASA's orbiters from flight operations. Though Columbia has undergone other major modifications in Palmdale, CA, its first OMDP was in 1994.

While in California, workers will perform more than 100 modifications on the vehicle. Columbia will be the second orbiter outfitted with the multi-functional electronic display system (MEDS) or "glass cockpit". Last year, Shuttle Atlantis had the full-color, flat-panel displays installed on its flight deck during an OMDP. The new system improves crew interaction with the orbiter during flight and reduces the high cost of maintaining the outdated electromechanical cockpit displays currently onboard.

While her sister ships are being outfitted with external airlocks in support of the International Space Station assembly, Columbia's internal airlock will not be removed during this OMDP. Thus, Columbia will continue to be able to accommodate payloads requiring the orbiter's 60-foot long cargo bay. Though not currently slated to dock with the International Space Station, Columbia will be given additional wire harnesses and connectors while at Palmdale to allow installation of the Orbiter Docking System at Kennedy Space Center. This prepares Columbia for docking operations with the space station if plans change.

While at Palmdale, Columbia's 100 miles of wiring will be given a thorough inspection. This is part of NASA's fleet wide wiring inspection. The wiring problem was first identified on Columbia as a result of the STS-93 mission.

Preparation work for an enhanced Global Positioning Satellite system capability will also be performed on Columbia. When installed, the new system will more accurately pinpoint the orbiter's location in flight. A space-to-space orbiter radio and wireless video modification will increase communication capabilities for Columbia's future crew members and space walkers. In addition to scheduled weight saving modifications, Columbia's radiators or coolant lines will be enhanced for protection

from orbital debris.

Columbia was rolled out of KSC's Orbiter Processing Facility bay 3 today, bound for the Shuttle Landing Facility's Mate-Demate Device. Later today, the orbiter will be mated, in "piggy-back" fashion, to the Boeing 747 Shuttle Carrier Aircraft (SCA). Ferry flight departure may occur as early as 7 a.m. Friday, Sept. 24.

The coupled orbiter and SCA are expected to make a one-day cross-country flight to California, with a planned refueling stop at the Naval Air Station in Fort Worth, Texas. All ferry flight plans are subject to weather restrictions and alternate landing sites may be selected en route if necessary. The original ferry flight plan included an overnight stop at Luke Air Force Base in Arizona for refueling and to accommodate several Air Force public affairs events. Following the crash of an F-16 at Luke on Monday and an expected one-day slip in Columbia's arrival in Arizona, Luke officials expressed Shuttle support concerns and agreed to cancel the visit.

Ferry flight rules state the orbiter/SCA cannot fly through precipitation, thick clouds or high turbulence. There are also wind and temperature restrictions. Following the modification period, Columbia is expected to return to KSC in July of 2000.

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NOTE TO EDITORS: News media interested in viewing the orbiter/SCA departure from KSC must be at the KSC press site by 6 a.m. Friday for transport to the Shuttle Landing Facility. Media should call the KSC Press Site before close of business today to confirm the departure time.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

December 2, 1999
KSC Contact: Joel Wells
NASA Release No. 99-141

LAUNCH OF HUBBLE SERVICING MISSION SET FOR DECEMBER 11

NASA managers today set Saturday, Dec. 11, 1999, as the launch date for NASA's final Space Shuttle mission this century. The 96th Space Shuttle mission will be highlighted by four space walks to service the Hubble Space Telescope.

Discovery is scheduled to lift off from Launch Pad 39-B at NASA's Kennedy Space Center, FL, at 12:13 a.m. EST, the opening of a 38-minute launch window. Discovery's planned 10-day flight, designated Shuttle mission STS-103, is scheduled to end with a night landing at Kennedy at about 9:21 p.m. EST on Dec. 20.

Also dubbed Hubble Servicing Mission 3A, the flight will feature an international crew of seven astronauts who will replace the telescope's six gyroscopes, a fine-guidance sensor, a transmitter, a spare solid-state recorder and a high-voltage/temperature kit for protecting the batteries from overheating. In addition, the crew will install an advanced computer that is 20 times faster and has six times the memory of the current Hubble Space Telescope computer.

Discovery's 27th flight will be commanded by Air Force Col. Curt Brown, who will be flying for the sixth time. Navy Lt. Commander Scott Kelly is serving as the pilot on his first Shuttle mission. The five mission specialists for STS-103 are: Steve Smith, who is serving as Payload Commander on his third shuttle mission; Michael Foale, Ph.D., who is making his fifth flight into space and who spent 4.5 months aboard the Russian Mir Space Station; John Grunsfeld, Ph.D., who will be making his third space flight; Claude Nicollier of the European Space Agency, who will fly for the fourth time on the Shuttle; and Jean-Francois Clervoy of the European Space Agency, who will be making his third trip aboard the Shuttle.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

October 4, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 128-99

NASA LICENSES FIRST KSC TECHNOLOGY TO FOREIGN COMPANY

Kennedy Space Center, the starting point for many missions to the far reaches of space, has crossed a less distant commercial frontier. A NASA-patented supersonic cleaning system technology developed at KSC has been transferred to a Dutch firm, marking the first time in KSC history that a U.S. patent owned by NASA has been licensed to a foreign company.

Melanie Chan, Technology Programs Manager, Licensing and Dual Use, said that CryCle Cryogenic Development NV plans to develop and market the Gas/Liquid Supersonic Cleaning System, originally developed as a cleanliness verification tool to replace environmentally harmful solvents. Under terms of the patent license agreement, the company must substantially manufacture the system in the United States and is restricted to European marketing and sales. NASA inventors, as well as KSC, benefit from the collection of royalties that are negotiated as part of all patent license terms.

NASA-KSC inventors Eric Thaxton, Raoul Caimi and Gary Lin developed the technology for cleanliness verification of complex Space Shuttle mechanical and electronic parts. The system is suitable for a wide range of applications, from cleaning electronic circuit boards to scouring building exteriors.

Ron Barile, a scientist with KSC contractor Dynacs Engineering Co., said that traditional high-pressure spray systems use very large quantities of solvents. Dr. Barile, who performed the technology's testing and verification, noted that disposal of these solvents creates an environmental problem, especially with the use of Freon 113 or other chlorofluorocarbons.

NASA's invention overcomes the deficiencies of prior systems. The spray system accelerates a gas-liquid mixture to a supersonic velocity for cleaning or contamination removal, using less than 100 milliliters of water per minute. The liquid (typically water) can be collected and sampled to verify cleanliness.

CryCle Cryogenic is a small, high-tech business established in 1997. The company has partnerships with several American companies for other technological development and market support. It has successfully commercialized the Cryo-Beamä, a precision cutting system that uses highly pressurized liquid nitrogen.

CryCle Founder and Director Theodorus van Bakkum and Managing Director Aad van Rhijn took part in a formal license signing ceremony August 27 in the office of

KSC Center Director Roy Bridges. Van Bakkum said his company is interested in preserving natural resources as part of its business philosophy and in conformance with strict European environmental regulations. He said KSC's cleaning system fits this category because of its extremely low water consumption. The company plans to introduce the technology next March, in Germany, at the world's largest industrial fair, with the first prototype planned for April.

"The NASA technology could help save enormous amounts of water used in all kinds of industries, including food, pharmaceutical, chemical, and electronics," Van Bakkum said.

Va-Tran Systems of Chula Vista, Calif., holds the U.S. patent rights and is marketing its own version of the cleaning system. Va-Tran found in further studies of the system that it is also excellent for removal of adhesive, flux, fingerprints and heavy hydrocarbon contamination.

For more information on this technology, contact Melanie R. Chan, Technology Programs Manager for Licensing and Dual-Use, at 407-867-6367.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

October 8, 1999
KSC Contact: George H. Diller
KSC Release No. 129-99

Note to Editors/News Directors:
HUBBLE SPACE TELESCOPE SERVICING-3A MISSION PAYLOAD SCHEDULED FOR NEWS MEDIA SHOWING OCT. 13

The payload for the third Hubble Space Telescope (HST) servicing mission will be the focus of a media opportunity on Wednesday, Oct. 13 at 1 p.m. Members of the media will be allowed to view and photograph the STS-103 payload flight hardware and talk with HST project representatives.

This servicing mission is designed to replace aging parts on the 9-year-old observatory and upgrade some of its functioning systems. During the flight, the astronauts will replace all six of Hubble's gyroscopes, a fine guidance sensor, the spacecraft's main computer, and other equipment.

Upon arriving at the Payload Hazardous Servicing Facility (PHSF) where the flight hardware is being processed, media will participate in a 15-minute orientation to explain the two primary payload flight elements of the 3A servicing mission that will be seen. Then media will be taken to the PHSF high bay.

Four Hubble Space Telescope representatives from NASA's Goddard Space Flight Center in Greenbelt, Md. will be available inside the facility clean room with the payload flight hardware to do interviews and to answer questions. They are:

- Dr. John Campbell, HST Program Manager/Associate Director
- Frank Cepollina, HST Development Project Manager
- Kevin Carmack, Launch Site HST Operations Manager
- Craig Coltharp, HST Integration and Test Manager

Before entering the PHSF high bay area, media must submit to a routine security search of camera and utility bags. Due to extensive clean room requirements, media planning to attend are requested to wear long pants and closed-toe shoes, and dress in clean room attire (bunny suits) which will be provided. No suede, leather or vinyl attire or accessories are permitted. Please avoid using makeup, perfume or cologne.

Quality control personnel will clean photographic equipment with alcohol wipes before it can be permitted in the clean room area. Special plastic bags will be provided for photographic accessories. No food, chewing gum, tobacco, lighters, matches, pencils or pocketknives will be permitted inside the clean room. Electronic flash photography is permitted. The lighting in the facility is high-pressure sodium (orange).

Media needing accreditation should contact the NASA-KSC News Center at 407/867-2468 by the close of business Tuesday, Oct. 12. Departure from the KSC News Center for the PHSF will be at 1 p.m. on Wednesday, Oct. 13. Arrival back at the press site will be by 3:30 p.m.

For automatic e-mail subscriptions to this daily Shuttle status report or KSC-originated press releases, send an Internet electronic mail message to domo@news.ksc.nasa.gov. In the body of the message (not the subject line) type the words "subscribe shuttle-status", or "subscribe ksc-press-release" (do not use quotation marks). The system will reply with a confirmation via e-mail of each subscription.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

October 15, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 130-99

BUSINESS EXPO PROMISES NETWORKING OPPORTUNITIES FOR VENDORS

Business leaders interested in learning more about government contracting and what local and national vendors have to offer won't want to miss the Business Opportunities Expo '99 on Wed., October 27. The Expo will be held from 9 a.m. to 3 p.m. in Cruise Terminal No. 5 at Port Canaveral.

The annual trade show - sponsored by the NASA/Kennedy Space Center Small Business Council, 45th Space Wing and Canaveral Port Authority - will feature 129 business and government exhibitors, some from Brevard and others from across the country.

Exhibitors will include vendors from a variety of product and service areas, including computer technology, printed circuit boards, safety products and more. Representatives of NASA, the 45th Space Wing, prime contractors and Spaceport Florida Authority will be available to give out information and answer specific questions about doing business with their respective organizations. Admission is free and open to the public.

"This is an incredible networking and information gathering opportunity for area business people. We've gotten a good response in the past, so we're hoping even more area businesses will make use of the opportunity this year," said Celene Morgan, small business liason with NASA's Central Industry Assistance Office.

Morgan's office provides support to small businesses who want to do business at KSC. Her office works with the NASA/KSC Small Business Council - lead by United Space Alliance, The Boeing Co., Space Gateway Support and Dynacs Engineering Inc. - to help small businesses learn how to navigate in the world of government contracting. By co-sponsoring the Expo, the Council provides a one-stop environment for buyers and sellers. Both sides benefit.

"We exhibited for the first time last year and it brought us a new customer that very day," said Doug Brown, president of Charlie Brown Distributing, an office, computer and toner supply company in Rockledge. "They called my office while I was still at the Expo and asked for a sales rep to be sent out. It's a year later and we're still doing business with them. I think the Expo is an excellent business forum and am looking forward to participating this year."

Also, to kick off the Expo, NASA/KSC will present a Contractor Awards

Ceremony. The following companies will be honored this year:

Large business prime contractor, The Boeing Co.
Small disadvantaged business prime contractor, Dynacs Engineering Inc.
Women-owned small business prime contractor, Dynamac Corp.
Small business prime contractor of the year, Jack B. Kelley Inc.
Small disadvantaged business subcontractor, Oneida Construction
Women-owned small business subcontractor, Chemko Technical Services
Small business subcontractor, Analex Corp.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

October 18, 1999
KSC Contact: George H. Diller
KSC Release No. 131-99

REQUEST FOR PROPOSAL ISSUED FOR LAUNCH SERVICES CONTRACTS

NASA today released a Request for Proposal (RFP) for multiple award Indefinite Delivery Indefinite Quantity (IDIQ) Launch Services contracts covering a broad range of expendable launch vehicles. Called the NASA Launch Services contracts, the RFP includes medium-light, medium, intermediate and heavy launch vehicles with a performance capability of launching payloads of 3,300 pounds and greater. Traditional examples of vehicles in this performance range are the Athena II, Delta and Atlas class family of expendable launch vehicles.

The NASA Launch Services contracts will span a 10-year period and include an initial mission set of three firm launches with six additional launch options. The contracts also include an IDIQ portion under which up to 60 additional launches can be competed and awarded. If all firm, option and IDIQ launches are awarded, the total value of the NASA Launch Services contracts could exceed five billion dollars.

The NASA Launch Services contracts also contain an "on-ramp" clause under the IDIQ contract portion. This will create an opportunity for new, emerging launch service providers and incumbents to introduce qualified launch vehicles not available at the time of the award of the initial contracts, and to compete for additional launch service requirements not identified as firm or option requirements under the basic contracts.

NASA is soliciting proposals from all interested companies. It is NASA's intent to award multiple IDIQ "task order" contracts that will encompass a broad range of launch vehicles. To be eligible for award of a contract, the potential launch service provider must be a domestic company with at least 51 percent United States ownership. It must also have demonstrated at least one successful launch of at least a 1,500 kilogram (3,315 pound) payload to a 200-kilometer (125 mile) circular orbit at a 28.5 degree inclination.

The launch vehicle to be considered must be a domestic product with a least 51 percent of its components manufactured in the United States. Also, the potential launch service provider and its subcontractors must have ISO 9001 certification.

Proposals are due at the Kennedy Space Center not later than Jan. 7, 2000. The contract awards will be made during the second quarter of 2000.

send an Internet electronic mail message to domo@news.ksc.nasa.gov. In the body of the message (not the subject line) type the words "subscribe shuttle-status", or "subscribe ksc-press-release" (do not use quotation marks). The system will reply with a confirmation via e-mail of each subscription.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

October 20, 1999
KSC Contact: Joel Wells
KSC Release No. 132-99

KSC WORKERS PROVIDE UPGRADED COMPUTER EQUIPMENT TO SCHOOLS

Thirteen Brevard County schools are receiving 81 excess contractor computers thanks to an innovative educational outreach project spearheaded by the NASA K-12 Education Services Office at Kennedy Space Center.

The Astronaut Memorial Foundation (AMF), a strategic partner in the effort, and several schools in rural Florida and Georgia also received refurbished computers as part of the year-long project. A total of $90,000 in upgraded computer equipment is being donated.

While used computer donation programs are not unusual, what makes this project different is that the computers given have been inspected, cleaned and upgraded to be able to run modern software, said Denise Coleman, educational outreach specialist with the Education Services Office. The original idea for the project resulted from a survey of area schools Coleman sent out about a year and a half ago. The survey showed many schools needed help with computers.

"Just offering them excess equipment isn't enough. Too often donated computers just pile up against the wall in schools because they aren't in working order and the schools typically don't have staff with the technical expertise to repair the equipment," Coleman said. "The missing link is the volunteer who knows how to make them run."

KSC employees, primarily employees of the former USBI, put in about 3,300 volunteer hours to transform old, excess USBI computers into upgraded, usable units. More than 140 refurbished computers have already been provided to area schools, day care centers and other non-profit organizations to date.

"When children have access to computers, it's amazing how fast they learn to do so much with them. It's extremely rewarding to help them get access to a tool that can change their lives," said Freemont "Freebie" Bassett, the lead volunteer for the project. Bassett has made a hobby of rebuilding old computers for children whose families cannot otherwise afford a computer.

Because NASA was not legally able to accept the old USBI computers, the AMF took on the project and donated space at the Center for Space Education for testing the equipment, replacing parts, installing software and matching up working units.

Children at the first schools to receive the refurbished computers on Friday, October

1, tore into the protective plastic wrapping with their eyes glowing eyes as if it were Christmas Day.

"Computers help us learn. I think we'll get a better education because of them," said Keyra Magee, a sixth-grade student in Michelle Butler's class at South Lake Elelmentary.

Units have been delivered by USBI, AMF and NASA employees to the following Brevard County schools: Coquina Elementary, Titusville; South Lake Elementary, Titusville; Cambridge Elementary, Cocoa; and Audubon Elementary, Merritt Island. Additional computers will be available to the following elementary schools: Saturn, Cocoa; Fairglen, Cocoa; Imperial Estates, Titusville; Atlantis, Cocoa; Riverview, Titusville; and Mila, Merritt Island; as well as to Madison Middle School, Titusville; Cocoa Beach High School and Rockledge High School.

North and Central Brevard County schools were chosen through assessments completed by KSC volunteers and because several technology companies have programs to benefit schools in South Brevard.

Center Director Roy Bridges said the project is just the kind of thing he'd like to see more of at KSC. "NASA joined forces with our partners and together we helped contribute in a significant way to children's education," Bridges said. "It was good for the community, our employees and the future of the space program. Who knows, some of those children working on those computers might help make the vision of our Spaceport Technology Center a reality."

In addition to the computer project, NASA KSC also participates in the federal Computers for Learning program that offers excess computers to schools via Internet requests. The program follows an effort made more than a year ago to offer schools free used computer components through the Ransom Road excess location. Public, private and home schools can access this program at website www.computers.fed.gov.

Coleman's next goal is to set up an ongoing computer refurbishment/repair program in conjunction with area colleges and universities. Because a number of those schools feature computer repair classes, the volunteer work would be a great learning experience for students. A consortium is needed to keep going the good work that KSC employees started, Coleman said.

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NOTE: Video and still photos of recent computer deliveries are available at the KSC Press Site. Still photos can also be accessed at the Publishers Photo Corner on KSC's website at www.ksc.nasa.gov

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NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

October 22, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 133-99

ZERO EMISSIONS BUS ROLLS INTO KSC NEXT WEEK FOR DEMONSTRATIONS

Kennedy Space Center has invited the Zero Emissions (ZE) transit bus to visit the center next week to help educate employees and the visiting public about an alternate energy source, which could become a major source of power for vehicles in the future.

The ZE bus uses a Proton Exchange Membrane (PEM) fuel cell in which hydrogen and oxygen, from atmospheric air, react to produce electricity that powers an electric motor drive system. The by-product "exhaust" from the fuel cell is water vapor, thus zero harmful emissions. A typical diesel-powered bus emits over a ton of harmful pollutants from its exhaust every year.

The ZE bus demonstration is one of a number of activities planned by KSC's Alternative Fuel Initiatives Program for October, which is EPA's Energy Awareness Month. KSC Center Director Roy Bridges has made "Environmental Leadership" one of the center's four guiding principles.

"There are many connections between ZE bus technology and NASA," said H.T. Everett, chief of the Liquid Propellants and Fluids Management Office in the KSC Logistics Operations Directorate. "Those include NASA's experience with fuel cells, our experience with hydrogen as a clean fuel, our goals in technology advancement and public awareness, and our goals in environmental stewardship."

An early version of the PEM fuel cell technology was used in the Gemini program. The Shuttle Program (and Apollo previously) uses alkaline fuel cells to produce electricity and water during flight. NASA continues to research the different fuel cell technology at several of its centers across the country. PEM fuel cells are under consideration for use in the Shuttle Upgrades Program.

KSC has sought to be a leader in promoting clean fuels, Everett said. Our Alternative Fuels Initiative Program leads the agency by using 165 vehicles that use compressed natural gas. Natural gas technology is a bridge between the use of gasoline to the use of the ultimate clean fuel, hydrogen.

"The cost of fuel cell engines has to come down before this new technology will gain widespread usage," Everett said.

Delaware North Parks Services (DNPS) of Spaceport Inc., which manages the Visitor Complex for NASA, will use the ZE bus opportunity to get a better

understanding of the technology.

"One of our goals is highlighting technology developed by the space program and showing our visitors the direct and positive effect it has on them," said Brian Wright, manager of public relations for DNPS . "We're always looking for new ways to showcase NASA technology that has been put into practical application."

The ZE bus is being brought to KSC by dbb fuel cell engines inc. of Vancouver, Canada. The company is an alliance of DaimlerChrysler, Ford Motor Co. and Ballard Power Systems. Ballard is a leading developer of PEM fuel cells for terrestrial transportation applications.

The public is invited to view and ride the Zero Emissions (ZE) transit bus, which will be running tour routes at the KSC Visitor Complex from 9 a.m. to 4 p.m. Oct. 26 - 27.

Editor's note: The Zero Emissions bus will be displayed for media photo opportunities, tours and rides in the Shuttle Plaza Area of the Visitor Complex from 1 to 4 p.m. on Oct. 25.

STS-103
Discovery

KSC Release No. 134-99
November 1999

The crew of Space Shuttle Discovery will tune-up the Hubble Space Telescope on a mission that will close out an impressive century of space flight and ensure that Hubble's revolutionary discoveries can continue into the new millennium.

Space Shuttle flight STS-103, the third Hubble Space Telescope servicing mission, is designed to upgrade the 9-year-old observatory and replace worn parts. Four spacewalks are planned during the flight. This servicing mission originally was scheduled for June 2000, but after three the third of Hubble's six gyroscopes failed, it was split into two separate missions. Discovery will fly the first, scheduled for Dec. 2, 1999, with the second to follow in 2001.

The gyroscopes, which are part of Hubble's pointing system, measure attitude when Hubble is changing its pointing from one target to another, and they help control the telescope's pointing while observing targets. provide a frame of reference to determine where the telescope is pointing and how that pointing changes as the telescope moves across the sky. Three working gyroscopes are needed to meet the telescope's precise pointing requirements.

During the mission, all six of Hubble's gyroscopes will be replaced. In addition, the crew will replace other equipment, including a guidance sensor and the spacecraft's main computer. The new computer, which is 20 times faster with six times more memory than its predecessorsHubble's original computer, will reduce flight software maintenance and significantly lower costs.

A voltage/temperature kit will be installed to protect spacecraft batteries from overcharging and overheating when the spacecraft goes into safe mode. A new transmitter will replace a failed spare currently aboard the spacecraft, and a spare solid state recorder will be installed to allow efficient handling of high-volume data. Telescope insulation that has degraded will be replaced. The insulation is necessary to control the internal temperature on the Hubble.

Because of periodic servicing missions planned throughout Hubble's 20-year mission lifespan, the observatory has and will continue to benefit from technological advances. The Hubble Space Telescope is the first observatory designed for extensive maintenance and refurbishment in orbit. Features such as handrails and foot restraints are built into the telescope to help astronauts perform servicing tasks in the Shuttle cargo bay as they orbit Earth at 17,500 mph.

The mission will be led by Commander Curtis L. Brown Jr. (Lt. Col., U.S. Air Force). Scott J. Kelly (Lt. Cmdr., U.S. Navy) will serve as Pilot and Steven L. Smith as Payload Commander. Mission Specialists are C. Michael Foale, Ph.D., John M. Grunsfeld, Ph.D., Claude Nicollier (Capt., Swiss Air Force) of the European Space Agency and Jean-Francois Clervoy, European Space Agency.

To prepare for their mission, the seven-member Discovery crew members trained extensively. Training for Brown and Kelly focused on rendezvous and proximity operations, such as retrieval and deployment of the telescope. Mission Specialists Smith, Foale, Grunsfeld, and Nicollier trained for the multiple spacewalks required during the mission. As principal operator of the robotic arm, Clervoy practiced specifically for capture and redeployment of the telescope, rotation and pivoting of the telescope on the Flight Support System, and related contingencies.

STS-103 is the 96th Space Shuttle mission and the 27th flight of Discovery. The Space Shuttle will lift off from Launch Pad 39B. The orbital insertion altitude will be 317 nautical miles (587 kilometers/365 statute miles), and inclination will be 28.45 degrees to the equator. Discovery will rendezvous with Hubble in orbit 320 nautical miles (512 km) above the Earth. Landing is scheduled for Kennedy's Shuttle Landing Facility.

The Crew

The Crew Commander Curtis L. Brown Jr. (Lt. Col., U.S. Air Force), who served as Mission Commander on two previous Shuttle missions and as Pilot on three others, will lead the STS-103 mission. His other missions include STS-47, STS-66, STS-77, STS-85 and STS-95 (a nine-day mission during which the crew supported a variety of research payloads including the Hubble Space Telescope Orbital Systems Test Platform). Brown, from Elizabethtown, N.C., received a bachelor of science degree in electrical engineering from the Air Force Academy in 1978. He served as an A-10 and F-16 test pilot before joining NASA and has logged over 6,000 hours flight time in jet aircraft. Brown logged over 1,190 hours in space since being selected by NASA in June 1987, as an astronaut candidate.

Payload Commander Steven L. Smith is a veteran of two space flights, STS-68 and STS-82 (the second Hubble servicing mission). Smith performed three spacewalks during STS-82. Smith was born in Phoenix, Ariz., but considers San Jose, Calif., to be his hometown. He received both bachelor and master of science degrees in electrical engineering and a master's degree in business administration, all from Stanford University. He was a payload officer with NASA before being selected as an astronaut candidate in March 1992.

Mission Specialist C. Michael Foale, Ph.D., will be making his fifth space flight after previously accumulating more than 160 days in space, including a four-month stay on the Russian space station, Mir. He was a Mission Specialist on STS-45, STS-56 and STS-63. Foale was born in Louth, England, but considers Cambridge, England, to be his hometown. He attended the University of Cambridge, Queens' College, receiving a bachelor of arts degree in physics, with first-class honors, in 1978. He completed his doctorate in Laboratory Astrophysics at Cambridge in 1982. Before Foale was selected as an astronaut candidate in June 1987, he was a payload officer in the Mission Control Center at Johnson Space Center.

Mission Specialist John M. Grunsfeld, Ph.D., has flown on two previous Shuttle missions, including STS-67 (the second flight of the Astro observatory, a complement of three telescopes) and STS-81. Born in Chicago, Grunsfeld received a bachelor of science degree in physics from the Massachusetts Institute of Technology in 1980, and a master of science degree and a doctor of philosophy degree in physics from the University of Chicago in 1984 and 1988, respectively. Grunsfeld started his astronaut training in August 1992, after holding numerous academic positions and performing research in various areas of astrophysics.

Mission Specialist Claude Nicollier, (Capt., Swiss Air Force) will be making his fourth space flight. His previous Shuttle missions include STS-46, STS-61 (the first Hubble Space Telescope servicing mission) and STS-75. Nicollier is a native of Vevey, Switzerland. He received a bachelor of science degree in physics from the University of Lausanne in 1970, and a master of science degree in astrophysics from the University of Geneva in 1975. Nicollier was selected as a European Space Agency astronaut in 1978, and, under an agreement between NASA and the European Space Agency, he joined the NASA astronaut candidates selected in May 1980.

Mission Specialist Jean-Francois Clervoy, a European Space Agency astronaut, has flown on two other Space Shuttle missions, STS-66 and STS-84. Clervoy, from Toulouse, France, received his baccalauréat from Collège Militaire de Saint Cyr l' Ecole in 1976, and graduated from Ecole Polytechnique, Paris, in 1981. He lectured in signal processing and general mechanics at the Ecole Nationale Superieure de l'Aeronautique et de l'Espace in Toulouse. He was selected as a French astronaut in 1985. Clervoy trained in Star City, Moscow, on the Soyuz and Mir systems in 1991, and was selected as an ESA astronaut in 1992.

Go to the *KSC Fact Sheets* home page

Go to the *KSC Press Releases* home page

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

October 29, 1999
KSC Contact: Joel Wells
KSC Release No. 135-99

Note to Editors:
FLORIDA GOVERNOR TO CALL KSC USING NEW (321) AREA CODE

Interested news media are invited to attend the ceremonial first phone call to Kennedy Space Center using the new telephone area code (321). Florida Governor Jeb Bush and KSC Director Roy Bridges will initiate a video teleconference call to KSC's Deputy Director for Business Operations Jim Jennings and other invited guests on Monday, Nov. 1 at 8 a.m.

In December of 1998, the Florida Public Service Commission approved an area code change from the current code (407). The plan will accommodate Central Florida's growing population and the rising number of telephones, faxes, cell phones and pagers.

The change is being phased in over a period of a year and a half beginning on Nov. 1. Since central Florida's space coast is America's spaceport, the new area code's similarity to a countdown is well suited for the area's space industry.

The video teleconference will be held in KSC's Headquarters Building. Interested news media should report to the KSC Press Site on Monday at 7 a.m. for transport to the event.

For more information on the area code change contact the Florida Public Service Commission at 1-800-342-3552.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

October 29, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 136-99

Note to Editors:
PRESIDENT OF AFL-CIO TO MEET WITH PRESS AT KSC VISITOR COMPLEX

AFL-CIO President John Sweeney will be touring Kennedy Space Center and Cape Canaveral Air Station on Monday, Nov. 1. Sweeney will be talking to KSC workers and managers throughout the tour. Media are invited to a meet and greet session for Sweeney from 1 to 1:45 p.m. at the Center for Space Education at the Kennedy Space Center Visitor Complex.

Sweeney, who will be visiting the area because he's a keynote speaker for an employee benefits conference in Orlando, requested to visit KSC and CCAS. About 5,000 union employees work in the space program. Seven affiliated international unions belonging to the AFL-CIO are represented.

Positive labor-management relations are fostered by NASA's Relations Management Office. The office hosts a monthly luncheon for employees and managers as part of its outreach efforts.

"We're as close as it gets to a blue-collar NASA center," said Sam Haddad, manager of the Industry Relations Office. "We've got many of our people here turning bolts and screws. We work hard to promote good working relationships."

For more information on Sweeney or the AFL-CIO, contact Deborah Dion at 202-637-5036.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

November 1, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 137-99

KSC PASSES ANOTHER MILESTONE ON A ROAD TO TECHNOLOGY DEVELOPMENT

Most Floridians only hear the designation A1A when listening to local traffic reports. Even though it is a popular beachfront thoroughfare on Florida's east coast, a completely different A-1A has taken a team of KSC experts on a journey to California - on a mission to support the X-34 program.

Since September, eight NASA engineering technicians from KSC's Engineering Prototype Lab have assisted Orbital Sciences Corporation and NASA's Dryden Flight Research Center in the complex process of converting the X-34 A-1 vehicle from captive carry status to unpowered flight status. The modified vehicle is now known as A-1A.

The X-34 is a reusable launch vehicle technology demonstrator that was designed and built by Orbital Sciences Corporation in Dulles, Virginia. In April, Orbital unveiled the first of three X-34 test vehicles, dubbed A-1, at Dryden on Edwards Air Force Base, CA. From June to September three captive carry flights were conducted with A-1 locked to the belly of Orbital's L-1011 airliner as part of planned safety checks. In July, X-34 project managers at NASA's Marshall Space Flight Center (MSFC) decided to upgrade the A-1 to a test flight vehicle in order to reduce technical and schedule risk to the subsequent A-2 and A-3 test vehicles.

KSC's workers were integrated into a team with Dryden and Orbital technicians. "Upon arrival, we threw our badges in a box and went to work as one unit," recalled Dave Rowell, a KSC mechanical engineering technician.

The captive-carry A-1 did not have hydraulics, avionics, landing gear mechanisms and the structural capability for a flight environment. KSC would provide the expertise needed for those upgrades following an X-34 program request in August.

"The experience enabled us to assist in the upgrading of the X-34 vehicle without an extensive training program," said Mike Dininny, the lead of the KSC contingent. "We worked many different areas of the vehicle - including the partial disassembly and modification of the wing, fuselage and tail section, as well as the fabrication and installation of tubing and components for the hydraulic system."

"Kennedy was able to identify resources that we needed and they helped us achieve an aggressive schedule," said Orbital's Vice President and X-34 program manager, Dr. Robert Lindberg. "This project demonstrates that KSC's influence goes beyond

the Space Shuttle."

Following the A-1A modifications, managers plan to tow test the vehicle behind a Kenworth tractor provided by Dryden, resume captive carry flights with the L-1011 and then proceed to unpowered drop tests in 2000. Powered flights of the A-2 vehicle are expected to begin at Dryden next summer.

Once the X-34 has demonstrated safe and reliable performance at Dryden, the project is scheduled to move to Kennedy Space Center for operational and technology demonstration flights.

"Our contributions so far have developed our experience in flight vehicle modifications and integration, including extensive work with composite materials," noted John Tinsley, KSC's X-34 project manager, "and this additional capability should prove valuable for the future increase in research and development activities at KSC. This will also help our involvement in the future reusable launch vehicle environment."

A single-engine rocket with short wings and a small tail surface, the X-34 suborbital aerospace vehicle will demonstrate low-cost reusability, autonomous landing, subsonic flights through inclement weather, safe abort conditions and landing in 20-knot cross winds.

The vehicle is 58.3 feet long, 27.7 feet wide from wing tip to wing tip and 11.5 feet tall from the bottom of the fuselage to the top of the tail. The autonomously operated technology demonstrator will be air-launched from an L-1011 airplane and should be capable of flying eight times the speed of sound, reaching an altitude of 250,000 feet.

Key technologies to be demonstrated by the X-34 include composite primary and secondary airframe structures; composite reusable propellant tanks, cryogenic insulation and propulsion system elements; advanced thermal protection systems and materials; low-cost avionics; integrated vehicle health monitoring system; flush air data system; and automated vehicle checkout.

The X-34 Project is managed by NASA's Marshall Space Flight Center in Huntsville, AL.

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NOTE: Video and still photos of the KSC team working on the X-34 are available at the KSC Press Site. Photos are also available at Publishers Photo Corner on KSC's website at www.ksc.nasa.gov

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NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

October 29, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 138-99

Note to Editors:
KSC/CCAS OPEN HOUSE SET FOR SATURDAY NOV. 6

The 1999 KSC/CCAS Employee Open House will take place Saturday, Nov. 6, from 9 a.m. to 2:30 p.m. at Kennedy Space Center and Cape Canaveral Air Station.

Accredited media with KSC annual badges interested in covering this year's open house as a news event must come to the KSC Press Site where a NASA Public Affairs escort will be available to accompany them to various locations open to KSC employees and their families.

Media who currently hold NASA picture badges will be permitted to attend the open house as a guest and can visit the open facilities without an escort.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

November 5, 1999
KSC Contact: George H. Diller
KSC Release No. 139-99

Note to Editors/News Directors:
TERRA SPACECRAFT SCHEDULED FOR NEWS MEDIA SHOWING NOV. 9

Terra, the first Earth Observing System scientific research satellite, will be the focus of a media photo opportunity on Tuesday, Nov. 9, at 10 a.m. PST. Members of the media will be allowed to view and photograph the satellite inside a spacecraft clean room at Vandenberg Air Force Base, Ca. and talk with project representatives from NASA.

Terra, originally called EOS AM-1, is the NASA flagship in a new series of satellites which represents a key contribution to the U.S. Global Change Research Program. Terra carries five state-of-the-art sets of instruments with measurement and accuracy capabilities never flown before. Terra takes a global approach to data collection enabling scientists to study the interactions among the four spheres of the Earth system--the oceans, lands, atmosphere, and biosphere.

Upon arriving at the Astrotech payload processing facility at Vandenberg where the satellite is being prepared for launch, media may be asked to submit to a routine security search of camera and utility bags. Due to clean room requirements, media planning to attend are requested to wear long pants and closed-toe shoes, and may also be asked to don clean room attire (bunny suits) which will be provided. No suede, leather or vinyl attire or accessories are permitted. Please avoid using makeup, perfume or cologne.

Quality control personnel may ask that photographic equipment be cleaned with alcohol wipes before it can be permitted in the clean room area. No food, chewing gum, tobacco, lighters, matches, pencils or pocket knives will be permitted inside the clean room. Electronic flash photography is permitted.

Media needing accreditation should contact the Air Force Public Affairs office at Vandenberg Air Force Base at 805/606-3595. On the day of the event, Tuesday, Nov. 9, media should meet at Vandenberg's main gate at 10 a.m. for escort to the Astrotech facility. The event should conclude at approximately Noon.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

November 8, 1999
KSC Contact: Joel Wells
KSC Release No. 140-99

Note to Editors/News Directors:
SHUTTLE DISCOVERY'S MOVE TO LAUNCH PAD PLANNED FOR TUESDAY MORNING

Shuttle managers plan to move Space Shuttle Discovery out to Launch Pad 39B tomorrow beginning at 2 a.m. Discovery is expected to arrive at the pad at about 8 a.m.

Accredited news media interested in attending first light coverage of Shuttle transfer activities should report to the KSC Press Site at 6:30 a.m. for transport to the crawlerway. The Press Site codaphone will be updated with Discovery's progress toward the pad as necessary. Media should call (321) 867-2525 for status.

NASA TV will provide live coverage of rollout beginning at 7 a.m.

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NOTE: Video and still photos of the rollout activities will be available at the KSC Press Site later in the day. Photos are also available at Publishers Photo Corner on KSC's website at www.ksc.nasa.gov

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NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

November 10, 1999
KSC Contact: Joel Wells
KSC Release No. 141-99

SPACE SHUTTLE DISCOVERY SET TO ROLLOUT TO LAUNCH PAD 39B NOV. 13

Towering atop the mobile launcher platform and crawler transporter, Space Shuttle Discovery is scheduled to emerge from the Vehicle Assembly Building at about 2 a.m. this Saturday. Discovery is expected to arrive at Launch Pad 39B by 8 a.m. to undergo final preparations for the STS-103 launch, targeted for Dec. 6.

The crawler transporter takes about 6 hours to complete its 4.2-mile trip to the pad. Soon after its arrival, the Rotating Service Structure will extend around the vehicle and launch pad validations will proceed through the weekend.

Orbiter Discovery arrived in KSC's Orbiter Processing Facility (OPF) on June 6 after completing mission STS-96, and moved to the Vehicle Assembly Building on Nov. 4. While in the OPF, Discovery underwent meticulous wiring inspections, repairs and protection efforts during a fleet-wide wiring investigation along with standard processing. After being mated to the external tank in VAB high bay 1, Discovery's main engine No. 3 and a range safety cable for the solid rocket boosters were removed and replacement efforts will conclude prior to the Shuttle's move to the pad.

Mission STS-103 is designed to replace worn parts on the 9-year-old Hubble Space Telescope and to upgrade other systems on the space observatory. All of the six gyroscopes that provide Hubble's pointing capability will be replaced on orbit along with other equipment like a guidance sensor and main computer. Four spacewalks are planned to support this flight. Commander Curt Brown, Pilot Scott Kelly; Payload Commander Steven Smith; and Mission Specialists Michael Foale, John Grunsfeld, Claude Nicollier, and Jean-Francois Clervoy make up the 7-member flight crew.

The cargo required to support the third Hubble Space Telescope servicing mission was delivered to the launch pad on Nov. 8 and will be installed into the orbiter's payload bay on Nov. 16. The payload interface verification tests begin later that week.

The Shuttle flight crew is slated to arrive at KSC Sunday, Nov. 14 to participate in the Terminal Countdown Demonstration Test (TCDT), set for Nov. 16 and 17. TCDT is held prior to each Space Shuttle flight and provides the crew opportunities to participate in full-dress, simulated countdown activities at KSC.

Discovery and crew are scheduled to launch on Dec. 6 at 2:37 a.m. marking the 27th flight of this orbiter. After 9 days and 21 hours in space, the second oldest orbiter in the fleet returns to KSC's Shuttle Landing Facility Dec. 15 at 11:57 p.m.

NOTE TO EDITORS: Accredited news media interested in viewing rollout activities should report to the KSC Press Site by 6:30 a.m. Saturday, Nov. 13 for departure at 7 a.m. Video footage and still photos of Discovery's move to the pad will be available at the Press Site. Media can monitor any updates to the rollout by calling the codaphone at 321-867-2525.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

November 15, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 142-99

Note to Editors:
MEDIA OPPORTUNITY WITH STS-103 CREW SET FOR THIS WEEK'S TCDT

The crew of Space Shuttle mission STS-103 is at Kennedy Space Center this week for the Terminal Countdown Demonstration Test (TCDT).

In preparation for this and other activities required prior to launch, Shuttle Discovery was rolled out of the Vehicle Assembly Building (VAB) to Launch Pad 39B on Saturday. First motion from the VAB occurred at about 7:27 a.m. and the vehicle was hard down on the pad at 2:17 p.m.

The TCDT is held at KSC prior to each Space Shuttle flight, providing the crew of each mission an opportunity to participate in simulated countdown activities. The TCDT ends with a mock launch countdown culminating in a simulated main engine cut-off. The crew also spends time undergoing emergency egress training exercises at the pad and has an opportunity to view and inspect the payloads in the orbiter's payload bay.

The seven-member crew of mission STS-103 arrived at KSC's Shuttle Landing Facility (SLF) yesterday afternoon.

On Tuesday, Nov. 16, news media representatives will have an opportunity to speak informally with and photograph the crew at Pad 39B. Media interested in participating in this question and answer session should be at the KSC Press Site by noon Tuesday for transport to the pad. This question and answer session will be a local media event only. However, the session will be covered live on NASA TV.

Wednesday morning, the entire crew will take part in simulated launch day events. Media interested in covering the crew walkout from the Operations and Checkout Building should be at the KSC Press Site by 6:45 a.m. Wednesday.

Once the crew is at the pad, they will enter the orbiter Discovery fully suited for the simulated Shuttle main engine ignition and cut-off. Following TCDT, the crew is scheduled to depart KSC for their homes in Houston for final flight preparations.

Discovery is targeted for launch on Dec. 6 at 2:37 a.m. EST. Mission STS-103 is scheduled to last 9 days, 21 hours, 20 minutes on the third servicing mission to the Hubble Space Telescope. Landing is targeted for Kennedy Space Center on Dec. 15 at 11:57 p.m.

Crew members for mission STS-103 are: Commander Curtis Brown; Pilot Scott Kelly; Mission Specialists Steve Smith, Michael Foale, and John Grunsfeld, as well as Claude Nicollier and Jean-Francois Clervoy, both of the European Space Agency.

For automatic e-mail subscriptions to this daily Shuttle status report or KSC-originated press releases, send an Internet electronic mail message to domo@news.ksc.nasa.gov. In the body of the message (not the subject line) type the words "subscribe shuttle-status", or "subscribe ksc-press-release" (do not use quotation marks). The system will reply with a confirmation via e-mail of each subscription.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

December 6, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 144-99

Notice to Editors/News Directors:
MISSION STS-103 EVENTS, NEWS CENTER OPERATING HOURS SET

News conferences, events and operating hours for KSC's News Center have been set for the Dec. 11 launch of the Space Shuttle Discovery on Mission STS-103, the 96th launch in the Shuttle program. Launch on Dec. 11 is set for 12:13 a.m. at the opening of a 38-minute window. The conferences and events will be carried live on NASA Television unless otherwise noted, and originate from the KSC Press Site.

The seven STS-103 crew members are scheduled to arrive at KSC Monday, Dec. 6 at about 8 p.m. EST. News media representatives planning to cover the event must be at the News Center by 7 p.m. (in the event of a possible early crew arrival) for transportation to the Shuttle Landing Facility.

News media representatives with proper authorization may obtain STS-103 mission credentials at the Pass and Identification Building on State Road 3 (south of KSC) on Merritt Island during published times. (Credential and badging hours are listed below.)

In addition to daily 9 a.m. countdown status briefings, the pre-launch press conference will be held three days before launch and a Hubble Space Telescope science briefing will be held the day prior to liftoff.

-- end of general release --

STS-103 BRIEFING & EVENTS SCHEDULE *(all times are EST)*
(All briefings are held inside the KSC Press Site auditorium and will be carried live on NASA TV unless otherwise noted)

8 p.m. Monday, Dec. 6 ----- *STS-103 Flight Crew Arrival (Live on NASA TV)*

L-3 Days - Wednesday, Dec. 8
(Launch countdown begins at 4:30 a.m.)

9 a.m. ----- *Countdown Status Briefing*

- Steve Altemus, NASA Test Director
- Steve Ernest, STS-103 Payload Manager
- Ed Priselac, Shuttle Weather Officer

4 p.m. ----- *Pre-launch News Conference*

- Ron Dittemore, Shuttle Program Manager, JSC
- Dave King, Director of Shuttle Operations, NASA, Kennedy Space Center
- European Space Agency representative TBD
- Captain Clif Stargardt, Staff Meteorologist, 45th Weather Squadron, USAF

L-2 Days - Thursday, Dec. 9

9 a.m. *----- Countdown Status Briefing*

- Doug Lyons, NASA Test Director
- Steve Ernest, STS-103 Payload Manager
- Ed Priselac, Shuttle Weather Officer

L-1 Day - Friday, Dec. 10

9 a.m. *----- Countdown Status Briefing*

- TBD

9:30 a.m. *----- Hubble Space Telescope Science Briefing*

- Dr. Ed Weiler, Associate Administrator for Space Science, NASA HQ
- Dr. John Campbell, Hubble Space Telescope Program Manager, Goddard Space Flight Center
- Dr. Anne Kinney, Director, Origins and Planetary Systems Program, NASA HQ

(Tanking begins at about 3 p.m. Friday)

7 p.m. *----- NASA Television live launch programming begins*

Launch Day Crew activities:
3:30 p.m. (Friday, Dec. 10) ----- Crew wake up
4 p.m. ----- Breakfast
**7:18 p.m. ----- Lunch (Crew Photo)*
7:48 p.m. ----- Weather briefing
**8 p.m. ----- Suit up photo*
**8:28 p.m. ----- Walkout*
**8:58 p.m. ----- Arrive at pad*
**10:13 p.m. ----- Close hatch*
****12:13 a.m. (Saturday, Dec. 11) ----- Launch of Discovery***
(Carried live on NASA TV)*

Launch + 1 hour *----- Post-launch Press Conference*

- Donald R. McMonagle, Manager, Launch Integration for the Space Shuttle Program
- Dave King, KSC Launch Director

(STS-103 MISSION STATUS BRIEFINGS WILL BE HELD DAILY THROUGHOUT THE MISSION. TIMES OF THESE BRIEFINGS ARE AVAILABLE IN THE NASA TV SCHEDULE AT: http://www.spaceflight.nasa.gov/realdata/nasatv/schedule.html)

KSC News Center office hours for STS-103

(Times may be adjusted in real time depending on mission events and timelines.)

Monday, Dec. 6 *(Launch minus 5 days)* ----- 8 a.m. - 11:30 p.m.
Tuesday, Dec. 7 *(Launch minus 4 days)* ----- 8 a.m. - 4:30 p.m.
Wednesday, Dec. 8 *(Launch minus 3 days)* ----- 7 a.m. - 7 p.m.
Thursday, Dec. 9 *(Launch minus 2 days)* ----- 8 a.m. - 4:30 p.m.
Friday, Dec. 10 *(Launch minus 1 day)* ----- 8 a.m. - round-the-clock
Saturday, Dec. 11 *(Launch Day) Flight day 1* ----- 12 noon
Sunday, Dec. 12 - *Flight day 2* ----- Closed
Mon. - Fri., Dec. 13-17 - *Flight days 3-7* ----- 8 a.m. - 4:30 p.m.
Saturday, Dec. 18 - *Flight day 8* ----- Closed
Sunday, Dec. 19 - *Flight day 9* ----- 3 p.m. - 5 p.m.
Monday, Dec. 20 *(Landing day) Flight day 10* ----- 8 a.m. - round-the-clock
Tuesday, Dec. 21 ----- 4:30 p.m.

News media may obtain STS-103 mission credentials at the Pass and Identification Building at Gate 2 on State Road 3, Merritt Island, during the following times:

Pass and Identification Hours

L-5 / Monday, Dec. 6 ---------- 12 noon - 7 p.m.
L-4 / Tuesday, Dec. 7 ---------- 8 a.m. - 12 noon
L-3 / Wednesday, Dec. 8 ------ 8 a.m. - 4:30 p.m.
L-2 / Thursday, Dec. 9 --------- 8 a.m. - 4:30 p.m.
L-1 / Friday, Dec. 10 ---------- 8 a.m. - 11 p.m.

News media with annual Shuttle credentials are reminded to sign the logbook at the query counter in the News Center.

NEWS MEDIA ARE REQUIRED TO BE UNDER PUBLIC AFFAIRS ESCORT AT ALL TIMES WHILE AT KSC EXCEPT WHEN DRIVING TO THE NEWS CENTER OR THE COMPLEX 39 CAFETERIA.

NEWS MEDIA ARE ALLOWED AT THE PRESS SITE ONLY WHEN PUBLIC AFFAIRS PERSONNEL ARE ON DUTY AND THE NASA NEWS CENTER IS OPEN.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

December 7, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 144-99 (Rev. A)

Notice to Editors/News Directors:
MISSION STS-103 EVENTS, NEWS CENTER OPERATING HOURS SET (Rev. A)

News conferences, events and operating hours for KSC's News Center have been set for the Dec. 11 launch of the Space Shuttle Discovery on Mission STS-103, the 96th launch in the Shuttle program. Launch on Dec. 11 has been rescheduled for 11:42 p.m. at the opening of a 42-minute window. The conferences and events will be carried live on NASA Television unless otherwise noted, and originate from the KSC Press Site.

News media representatives with proper authorization may obtain STS-103 mission credentials at the Pass and Identification Building on State Road 3 (south of KSC) on Merritt Island during published times. (Credential and badging hours are listed below.)

In addition to daily 9 a.m. countdown status briefings, there will be a Hubble Space Telescope science briefing and the pre-launch press conference, held three days before launch.

-- end of general release --

STS-103 BRIEFING & EVENTS SCHEDULE (Rev. A) *(all times are EST)*
(All briefings are held inside the KSC Press Site auditorium and will be carried live on NASA TV unless otherwise noted)

L-2 Days - Thursday, Dec. 9
(Launch countdown begins at 4 a.m.)

9 a.m. ----- *Countdown Status Briefing*

- Steve Altemus, NASA Test Director
- Steve Ernest, STS-103 Payload Manager
- Ed Priselac, Shuttle Weather Officer

4 p.m. ----- *Pre-launch News Conference*

- Ron Dittemore, Shuttle Program Manager, JSC
- Dave King, Director of Shuttle Operations, NASA, Kennedy Space Center
- European Space Agency representative TBD
- Captain Clif Stargardt, Staff Meteorologist, 45th Weather Squadron, USAF

L-1 Day - Friday, Dec. 10

9 a.m. ***-----*** *Countdown Status Briefing*

- Doug Lyons, NASA Test Director
- Steve Ernest, STS-103 Payload Manager
- Ed Priselac, Shuttle Weather Officer

10 a.m. ***-----*** *Hubble Space Telescope Science Briefing*

- Dr. Ed Weiler, Associate Administrator for Space Science, NASA HQ
- Dr. John Campbell, Hubble Space Telescope Program Manager, Goddard Space Flight Center
- Dr. Anne Kinney, Director, Origins and Planetary Systems Program, NASA HQ

L-0 Day - Saturday, Dec. 11
(Tanking begins at about 2:30 p.m. Saturday)

****6:30 p.m.*** ***-----*** *NASA Television live launch programming begins*

Launch Day Crew activities:
3 p.m. ----- Crew wake up
3:30 p.m. ----- Breakfast
**6:48 p.m. ----- Lunch (Crew Photo)*
7:18 p.m. ----- Weather briefing
**7:40 p.m. ----- Suit up photo*
**7:58 p.m. ----- Walkout*
**8:28 p.m. ----- Arrive at pad*
**9:42 p.m. ----- Close hatch*
****11:42 p.m. ----- Launch of Discovery***
(Carried live on NASA TV)*

Launch + 1 hour ***-----*** *Post-launch Press Conference*

- Donald R. McMonagle, Manager, Launch Integration for the Space Shuttle Program
- Dave King, KSC Launch Director

KSC News Center office hours for STS-103 (Rev. A)
(Times may be adjusted in real time depending on mission events and timelines.)

Wednesday, Dec. 8 *(Launch minus 3 days)* ----- 8 a.m. - 4:30 p.m.
Thursday, Dec. 9 *(Launch minus 2 days)* ----- 8 a.m. - 7 p.m.
Friday, Dec. 10 *(Launch minus 1 day)* ----- 8 a.m. - 7 p.m.
Saturday, Dec. 11 *(Launch Day)* ----- 5:30 a.m. - round-the-clock
Sunday, Dec. 12 - *Flight day 1* ----- through 10 a.m.
Mon. - Fri., Dec. 13-17 - *Flight days 2-6* ----- 8 a.m. - 4:30 p.m.
Saturday, Dec. 18 - *Flight day 7* ----- Closed
Sunday, Dec. 19 - *Flight day 8* ----- Closed
Monday, Dec. 20 *Flight day 9* ----- 8 a.m. - 4:30 p.m.
Tuesday, Dec. 21 *(Landing day) Flight day 10* ----- 8 a.m. - round-the-clock
Wednesday, Dec. 22 ----- through 4:30 p.m.

News media may obtain STS-103 mission credentials at the Pass and Identification

Building at Gate 2 on State Road 3, Merritt Island, during the following times:

Pass and Identification Hours

L-3 / Wednesday, Dec. 8 ------ 8 a.m. - 12 noon
L-2 / Thursday, Dec. 9 --------- 8 a.m. - 4:30 p.m.
L-1 / Friday, Dec. 10 ---------- 8 a.m. - 4:30 p.m.
L-0 / Saturday, Dec. 11 -------- 8 a.m. - 10:30 p.m.

News media with annual Shuttle credentials are reminded to sign the logbook at the query counter in the News Center.

NEWS MEDIA ARE REQUIRED TO BE UNDER PUBLIC AFFAIRS ESCORT AT ALL TIMES WHILE AT KSC EXCEPT WHEN DRIVING TO THE NEWS CENTER OR THE COMPLEX 39 CAFETERIA.

NEWS MEDIA ARE ALLOWED AT THE PRESS SITE ONLY WHEN PUBLIC AFFAIRS PERSONNEL ARE ON DUTY AND THE NASA NEWS CENTER IS OPEN.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

December 13, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 144-99 (Rev. B)

Notice to Editors/News Directors:
MISSION STS-103 EVENTS, NEWS CENTER OPERATING HOURS SET

News conferences, events and operating hours for KSC's News Center have been set for the rescheduled Dec. 16 launch of the Space Shuttle Discovery on Mission STS-103, the 96th launch in the Shuttle program. Launch on Dec. 16 has been set for 9:18 p.m. at the opening of a 41-minute window. The conferences and events will be carried live on NASA Television unless otherwise noted, and originate from the KSC Press Site.

News media representatives with proper authorization may obtain STS-103 mission credentials at the Pass and Identification Building on State Road 3 (south of KSC) on Merritt Island during published times. (Credential and badging hours are listed below.)

In addition to daily 9 a.m. countdown status briefings, there will be a Hubble Space Telescope science briefing and the pre-launch press conference, held three days before launch.

-- end of general release --

STS-103 BRIEFING & EVENTS SCHEDULE (Rev. B) *(all times are EST)*
(All briefings are held inside the KSC Press Site auditorium and will be carried live on NASA TV unless otherwise noted)

L-2 Days - Tuesday, Dec. 14
(Launch countdown begins at 1:30 a.m.)

9 a.m. ----- *Countdown Status Briefing*

- Steve Altemus, NASA Test Director
- Steve Ernest, STS-103 Payload Manager
- Ed Priselac, Shuttle Weather Officer

4 p.m. ----- *Pre-launch News Conference*

- Ron Dittemore, Shuttle Program Manager, JSC
- Dave King, Director of Shuttle Operations, NASA, Kennedy Space Center
- Captain Clif Stargardt, Staff Meteorologist, 45th Weather Squadron, USAF

L-1 Day - Wednesday, Dec. 15

9 a.m. ***-----*** *Countdown Status Briefing*

- Doug Lyons, NASA Test Director
- Steve Ernest, STS-103 Payload Manager
- Ed Priselac, Shuttle Weather Officer

10 a.m. ***-----*** *Hubble Space Telescope Science Briefing*

- Dr. Ed Weiler, Associate Administrator for Space Science, NASA HQ
- Dr. John Campbell, Hubble Space Telescope Program Manager, Goddard Space Flight Center
- Dr. Anne Kinney, Director, Origins and Planetary Systems Program, NASA HQ

L-0 Day - Thursday, Dec. 16
Tanking begins at about 11:45 a.m. Thursday

****4 p.m.*** ***-----*** *NASA Television live launch programming begins*

Launch Day Crew activities:
12:30 p.m. ----- Crew wake up
1 p.m. ----- Breakfast
**4:23 p.m. ----- Lunch (Crew Photo)*
4:53 p.m. ----- Weather briefing
**5:15 p.m. ----- Suit up photo*
**5:33 p.m. ----- Walkout*
**6:03 p.m. ----- Arrive at pad*
**7:18 p.m. ----- Close hatch*
****9:18 p.m. ----- Launch of Discovery***
(Carried live on NASA TV)*

Launch + 1 hour ***-----*** *Post-launch Press Conference*

- Donald R. McMonagle, Manager, Launch Integration for the Space Shuttle Program
- Dave King, Director of Shuttle Operations

KSC News Center office hours for STS-103 (Rev. B)
(Times may be adjusted in real time depending on mission events and timelines.)

Monday, Dec. 13 *(Launch minus 3 days)* ----- 8 a.m. - 4:30 p.m.
Tuesday, Dec. 14 *(Launch minus 2 days)* ----- 8 a.m. - 7 p.m.
Wednesday, Dec. 15 *(Launch minus 1 day)* ----- 8 a.m. - 7 p.m.
Thursday, Dec. 16 *Launch Day* ----- 8 a.m. - 1 a.m.(17th)
Friday, Dec. 17 *Flight day 1* ----- 8 a.m. - 4:30 p.m.
Saturday, Dec. 18 *Flight day 2* ----- Closed
Sunday, Dec. 19 *Flight day 3* ----- Closed
Mon. -Thurs., Dec. 20-23 *Flight days 4-7* ----- 8 a.m. - 4:30 p.m.
Friday, Dec. 24 *Flight day 8* ----- Closed
Saturday, Dec. 25 *Flight day 9 (Christmas Day)* ----- 12 - 2:30 p.m.
Sunday, Dec. 26 *Flight day 10 (Landing Day)* ----- 12 p.m. - 4 a.m. (27th)

In addition, the KSC Press Site will be open to support the in-flight Mission Status Briefings. The office will open one hour before the scheduled briefing and close no later than one hour after the briefing concludes. The times of those briefings can be

found on the NASA TV schedule at:
http://spaceflight.nasa.gov/realdata/nasatv/schedule.html

News media may obtain STS-103 mission credentials at the Pass and Identification Building at Gate 2 on State Road 3, Merritt Island, during the following times:

Pass and Identification Hours

L-2 Tuesday, Dec. 14-------- 8 a.m. - 4:30 p.m.
L-1 Wednesday, Dec. 15 --- 8 a.m. - 4:30 p.m.
L-0 Thursday, Dec. 16 ------ 8 a.m. - 8 p.m.

News media with annual Shuttle credentials are reminded to sign the logbook at the query counter in the News Center.

NEWS MEDIA ARE REQUIRED TO BE UNDER PUBLIC AFFAIRS ESCORT AT ALL TIMES WHILE AT KSC EXCEPT WHEN DRIVING TO THE NEWS CENTER OR THE COMPLEX 39 CAFETERIA.

NEWS MEDIA ARE ALLOWED AT THE PRESS SITE ONLY WHEN PUBLIC AFFAIRS PERSONNEL ARE ON DUTY AND THE NASA NEWS CENTER IS OPEN.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

December 6, 1999
KSC Contact: George H. Diller
KSC Release No. 145-99

Note to Editors/News Directors:
TERRA SPACECRAFT/ATLAS IIAS ROCKET READY FOR LAUNCH DEC. 16

The launch of NASA's Terra spacecraft aboard a Lockheed Martin Atlas IIAS rocket is scheduled to occur on Thursday, Dec. 16 from Space Launch Complex 3 East at Vandenberg Air Force Base, CA. The launch window is 25 minutes in duration extending from 10:33 - 10:58 a.m. PST.

Terra, originally called EOS AM-1, is the NASA flagship in a new series of satellites, which represents a key contribution to the U.S. Global Change Research Program. Terra carries five state-of-the-art sets of instruments with measurement and accuracy capabilities never flown before. Terra takes a global approach to data collection that will enable scientists to study the interaction among the four spheres of the Earth system--the oceans, lands, atmosphere and biosphere.

Long-term weather and climate prediction is a challenge now requiring the collection of better data over longer periods to understand the interactions and links among air, land, water and life within the Earth system. Moreover, Terra will also be able to measure and observe changes in the Earth's radiation energy budget important to the process. This is the amount of incoming energy from the sun minus outgoing energy from reflected sunlight and emitted heat.

ACCREDITATION

News media desiring accreditation for the launch of Terra should fax their request on news organization letterhead to:

George Diller
NASA Vandenberg Resident Office
Vandenberg Air Force Base, CA
FAX: 805/605-3380

A NASA Terra mission access badge will be issued prior to entering Vandenberg Air Force Base and will be valid for press activities scheduled for Dec. 15 -16. These include the prelaunch news conference, a launch pad tour, remote camera set-up, launch day tower roll-back photo opportunity and the launch.

For further information on launch accreditation call 321/867-2468. Beginning Monday, Dec. 13 call the NASA Terra News Center at Vandenberg Air Force Base 805/605-3051.

PRELAUNCH NEWS CONFERENCE

The prelaunch news conference will be held on Wednesday, Dec. 15 from 1 - 2 p.m. PST in the main conference room of the NASA Vandenberg Resident Office, Building 840, Vandenberg Air Force Base, CA. Participants will be:

Ghassem Asrar, Associate Administrator, Office of Earth Science
NASA Headquarters, Washington, D.C.

Ray Lugo, NASA Mission Director
Kennedy Space Center, FL

Tom Heter, Director, Vandenberg Launch Operations
Lockheed Martin Astronautics

Richard Ho, Terra Deputy Project Manager
Goddard Space Flight Center, MD

Captain Joe Kurtz, USAF Launch Weather Officer, 30th Weather Squadron
Vandenberg Air Force Base, CA

Media desiring to cover the prelaunch news conference should meet at the south gate of Vandenberg Air Force Base on California State Road 246 at 12:30 p.m. and will be escorted to the NASA Vandenberg Resident Office.

LAUNCH PAD TOUR

Following the prelaunch news conference, a tour will be offered to the news media of the new Atlas II launch pad to be used for Terra, Space Launch Complex 3 East. The tour will also include other launch-related facilities to be used for Terra. Other associated launch-related facilities will also be included. Those wishing to participate will be provided transportation from Building 840 to the pad.

REMOTE CAMERAS

Media desiring to establish sound-activated remote cameras at Space Launch Complex 3 East will depart on Wednesday, Dec. 15 at 10 a.m. from the south gate of Vandenberg Air Force Base on California State Route 246.

TOWER ROLL-BACK PHOTO OPPORTUNITY

On launch day, Dec. 16, there will be a photo opportunity at the pad for media desiring to observe the mobile service tower, or gantry, being retracted from around the Atlas rocket for launch. Those wishing to participate should be at the south gate of Vandenberg Air Force Base on California State Road 246 at 7:15 a.m.

LAUNCH DAY PRESS COVERAGE

Media covering the launch should be at the main gate visitor center parking lot located on California State Road 1 at 9 a.m. on Thursday, Dec. 16, to be escorted to the press site located on north Vandenberg Air Force Base. A Terra press badge will be required of all media at the press site. After launch, media will be escorted back to the main gate. A post-launch news conference will not be held.

NASA TELEVISION AND VOICE CIRCUIT COVERAGE

NASA Television will carry the prelaunch news conference starting at 1 p.m. PST on Wednesday, Dec. 15. On launch day, Dec. 16, NASA TV coverage of the countdown will begin at 8:30 a.m. PST and continue through spacecraft separation which occurs at 13 minutes 39 seconds into flight.

NASA Television is carried on GE-2, transponder 9C located at 85 degrees West longitude. Audio only will be available on the "V" circuits which may be reached by dialing 407/867-1220, 1240, 1260, 7135, 4003, 4920.

TERRA WEBCAST

A webcast of the Terra launch will be available on the NASA-KSC Home Page. The web site address is www.ksc.nasa.gov. Choose "KSC Live Video Feeds" followed by "NASA TV coverage."

NASA TERRA NEWS CENTER

The Terra News Center at the NASA Vandenberg Resident Office will be staffed beginning Monday, Dec. 13 and may be reached at 805/605-3051. A recorded launch status report will also be available starting at that time by dialing 805/734-2693.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

December 7, 1999
KSC Contact: Joel Wells
KSC Release No. 146-99

AIRSPACE, BRIDGES AND WATERWAY RESTRICTIONS IN EFFECT FOR ALL SPACE SHUTTLE LAUNCHES

With the STS-103 launch of Space Shuttle Discovery only days away, NASA managers urge all aircraft pilots and boaters to comply fully with the airspace, bridges and waterway restrictions imposed around KSC during all Shuttle launches and landings.

"As always, we are coordinating with officials from the Eastern Range and Federal Aviation Administration (FAA) to help provide a safe launch environment for the Shuttle crew and for interested spectators. Violating these restrictions is not only unsafe for the astronauts, it's unsafe for the violator," said KSC Launch Director Dave King.

Space Shuttle Discovery's first launch opportunity is on December 11 at 11:42 p.m. and the launch window extends for 42 minutes. At NASA's request, FAA surveillance aircraft will patrol KSC's airspace boundaries on launch day. Violators will be intercepted by patrol forces, thoroughly investigated and will be subject to FAA enforcement action.

A number of restrictions are placed in effect around the Kennedy Space Center (KSC) during the hours immediately preceding and following the launch of a Space Shuttle.

Listed and described below are restrictions that apply to pilots, motor vehicle operators and boaters utilizing airspace, bridges and waterways that lead to KSC.

KSC AREA AVIATION RESTRICTIONS

The airspace immediately above and around KSC will be limited to official aircraft only and will be off-limits to general aviation pilots prior to and during the launch of a Space Shuttle.

NOTAMS must be checked by pilots prior to flights near the KSC area. Pilots are warned that violations of KSC's restricted airspace may likely result in serious penalties, including the suspension or revocation of pilot privileges.

Official aircraft supporting the launch will be in the air. Private pilots must be aware that wandering into a restricted area is not only forbidden, but that it also creates a safety hazard to support aircraft and the errant pilot.

Anyone wishing to view the launch from the air below 11,000 feet should stay west of the Indian River. Above 11,000 feet, pilots should stay west of the St. Johns River. Pilots are advised that the airspace in the KSC vicinity is expected to be congested with both controlled and uncontrolled aircraft.

Pilots should also be aware of the Solid Rocket Booster (SRB) exhaust cloud that occurs after launch. They should stay at least five miles away from the cloud, even if it drifts out of the restricted area.

Generally, the airspace restrictions cover a variety of air ranges. In addition to the usual KSC and Cape Canaveral Air Station airspace restrictions, the upcoming launch requires that all private aircraft stay out of an area roughly bounded by the west side of the Indian River to the west, the Trident Basin (Port Canaveral) to the south, 10 miles north of Haulover Canal at the Oak Hill, FL city limit and a minimum of 50 miles seaward to the east. These restrictions are "surface to unlimited." Launch-specific restrictions begin three hours prior to the planned launch time.

Pilots should consult the most recent editions of the Jacksonville Sectional Aeronautical Chart and the Airman's Information Manual. In addition, they should contact the St. Petersburg Flight Service Station at 1-800-992-7433. (1-800-WX-BRIEF). Advisories will be available from the Space Center Executive Airport Tower (VHF 118.9 megahertz) or the NASA Tower (128.55 megahertz).

Pilots should also refer to the current Patrick Air Force Base news release concerning restricted airspace.

BRIDGES CONTROLLED FOR LAUNCH

The opening and closing of bridges over waterways surrounding KSC will be strictly controlled during the hours immediately before and after the launch period for each Space Shuttle mission.

Bridges affected by the launch include:

- **Canaveral Harbor Barge Canal** (SR 401, south of Cape Canaveral Air Station's Gate 1);
- **Indian River Causeway West or NASA Causeway** (Intracoastal Waterway at Addison Point);
- **Merritt Island Barge Canal** (Merritt Island State Road 3);
- **Haulover Canal Bridge** (State Road 3, north of KSC).

Restraints on bridge openings for boat traffic begin three hours before launch. The bridges may be opened for five minutes at the following points in the launch countdown: T-180 minutes, T-150 minutes, T-120 minutes, T-90 minutes, and T-65 minutes. Adding 20 minutes to these times and subtracting that amount from the launch time will result in an approximate time of openings.

Bridges will remain closed to boat traffic until 90 minutes after lift-off (T+90). They may then open for five minutes at T+90, T+120 minutes and T+150 minutes. Bridge operations will return to normal three hours (T+180 minutes) after launch.

Should the Shuttle be required to perform a Return-to-Launch-Site (RTLS) landing at KSC, all bridges would remain closed to boat traffic from 45 minutes before landing until at least one hour after landing.

KSC AREA BOATING RESTRICTIONS

Waterways and boating near the Kennedy Space Center will be strictly controlled prior to and during the launch of the Space Shuttle.

Safety and security requirements, including U.S. Air Force range safety impact limit lines, will go into effect as early as three days before launch. Other requirements will be phased into effect through sunset the night before launch. A general description of the area follows:

BANANA RIVER: Security limits begin at the Banana River Barge Canal south of KSC at the State Road 528 crossing and extend north. This restriction is effective roughly 12 hours prior to launch.

ATLANTIC OCEAN: Beginning the day before launch, a general exclusion zone will be in effect three miles offshore from the Haulover Canal, near the north end of KSC, and southward to Port Canaveral. Four hours prior to launch, all ocean-going traffic will be restricted from entering an area measured from five miles north and south of the launch pad and extending 30 miles east into the ocean. An additional three-mile-wide exclusion zone will be extended eastward along the projected flight path of the Space Shuttle.

MOSQUITO LAGOON: This area south of the Haulover Canal is off limits to all boats beginning the day before launch.

INDIAN RIVER: Restrictions apply from the NASA Causeway north to the Haulover Canal and east of the Indian River's main channel. Restrictions begin the day before launch.

All boating restrictions will be lifted approximately one hour after launch.

The U.S. Coast Guard, the U.S. Fish and Wildlife Service, and KSC security forces share responsibility for enforcing the boating guidelines.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

December 13, 1999
KSC Contact: George H. Diller
KSC Release No. 148-99

WEATHER BUOYS VITAL FOR FORECASTS BUT NEED SECLUSION

Have you recently been out fishing in the ocean and seen an unconventional-looking buoy with a lot of unusual devices on it bobbing up and down? Try to avoid the temptation for a closer look! Your presence could unknowingly be detrimental to a vital mission.

The unsung heroes of forecasting the weather for launching of the Space Shuttle are actually silent weather sentinels located offshore in the Atlantic Ocean where no human weather observer can be stationed. These are the automated weather buoys sending back hourly information critical to the Shuttle weather officer during a launch countdown. In addition, the National Oceanic and Atmospheric Administration's (NOAA) Spaceflight Meteorology Group in Houston counts heavily on this offshore data to generate the forecast for landing, either an unplanned return on launch day or a normal end-of-mission landing.

The data is relayed from the buoys via satellite from their station-keeping positions in the Atlantic Ocean. While the closest buoy is only 20 nautical miles offshore from Cape Canaveral moored in the Gulfstream of the Atlantic, another is at a far more distant location 110 nautical miles east-northeast of Cape Canaveral. The buoys are part of a national network of ocean weather buoys operated by the National Data Buoy Center, part of the National Weather Service at NOAA and located at the Stennis Space Center in Mississippi.

The information available to the forecasters is extensive and includes sea water temperature, wave height and period information and the customary weather data consisting of temperature, wind, humidity, barometric pressure and precipitation.

"This data is absolutely essential to us since we have no other way to monitor weather data east of the Cape. The offshore sea conditions are especially significant in developing our forecast and for predicting conditions for solid rocket booster retrieval operations," said Ed Priselac, Shuttle Weather Officer.

This year the buoys were subjected to two severe storms, Hurricane Floyd and Hurricane Irene. On Sept. 15, at the height of Hurricane Floyd, the 110-mile weather buoy went adrift, breaking loose from its mooring in waves 50 feet and higher with 80 mile-per-hour sustained winds and gusts exceeding 100 miles per hour. NASA's solid rocket booster retrieval ship Freedom Star was dispatched and returned the buoy to Port Canaveral. A new buoy was towed out to sea by the Liberty Star, arriving at its permanent location on Nov. 23.

Also this summer, the 20-nautical mile weather buoy broke loose from its mooring, suffering damage as the result of an apparent collision with a boat. It was returned to Port Canaveral by the U.S. Coast Guard, but because of the extensive damage was immediately replaced with a new weather buoy to minimize the time that weather data from this critical location was unavailable.

Not only are these buoys important to meteorologists, but also to the National Weather Service office in Melbourne, FL. They routinely issue the official coastal waters forecast from Flagler Beach to Cocoa Beach to Jupiter Inlet. The data from the buoy 20 nautical miles offshore is absolutely critical to have accurate forecasts of wind and seas over the area offshore from Brevard County.

"When the buoy reports are missing, the quality of the marine forecast suffers," said Bart Hagemeyer, Director of the National Weather Service Melbourne office. The reports from the buoy of long-period swells, or large swells generated by Atlantic ocean storms farther offshore are often tip-offs that rip currents, heavy surf or even coastal flooding may develop.

Mariners and surfers with local knowledge have also developed a knack for making their own forecast by following the hourly buoy reports and observing trends. The fishing industry and other recreational fishing interests also find the information from these weather buoys particularly helpful in estimating the local fishing conditions.

However, because these buoys are located in good fishing areas, particularly the 20-nautical-mile buoy, fishermen have been known to sometimes tie their boats to the buoys, or even actually fish off them, not being aware that this affects the accuracy of the data. The buoy itself can also be damaged, particularly if a boat should accidentally run into it, as has happened recently. Left alone, these buoys are highly reliable and can remain on station for six to ten years with only periodic maintenance every two or three years.

The weather reports from the 20-nautical-mile buoy are broadcast hourly on NOAA Weather Radio, heard locally at 162.55 mhz. Information on the National Data Buoy Center's network system of 67 weather buoys can be found on the World Wide Web at http://ndbc.noaa.gov, or by dialing the automated "Dial-a-Buoy" system at 228/688-1948.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

December 13, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 149-99

Note to Editors:
KEY ROADS INTO KSC CLOSED PRIOR TO SHUTTLE LAUNCH

Prior to launch of the Space Shuttle Discovery on mission STS-103, State Road 405 and State Road 3 going into Kennedy Space Center will be closed to the general public.

Closure of these roads will begin on Thursday Dec. 16 from 3 p.m. through launch, currently scheduled for 9:18 p.m. Only badged KSC/CCAS personnel will be allowed access during these times.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

December 13, 1999
KSC Contact: George H. Diller
KSC Release No. 150-99

SPACE SHUTTLE WEATHER LAUNCH COMMIT CRITERIA AND KSC END OF MISSION WEATHER LANDING CRITERIA

The launch weather guidelines involving the Space Shuttle and expendable rockets are similar in many areas, but a distinction is made for the individual characteristics of each. The criteria are broadly conservative and assure avoidance of possibly adverse conditions. They are reviewed for each launch.

For the Space Shuttle, weather forecasts are provided by the U. S. Air Force Range Weather Operations Facility at Cape Canaveral begining at Launch minus 4 days in coordination with the NOAA National Weather Service Spaceflight Meteorology Group (SMG) at the Johnson Space Center in Houston. These include weather trends and their possible effects on launch day. A formal prelaunch weather briefing is held on Launch minus 1 day which is a specific weather briefing for all areas of Space Shuttle launch operations.

Launch weather forecasts, ground operations forecasts, and launch weather briefings for the Mission Management Team and the Space Shuttle Launch Director are prepared by the Range Weather Operations Facility. Forecasts which apply after launch are prepared by SMG. These include all emergency landing forecasts and the end of mission forecasts briefed by SMG to the astronauts, the Flight Director and Mission Management Team.

During the countdown, formal weather briefings occur approximately as follows:

L-24 hr 0 min: Briefing for Flight Director and astronauts
L-21 hr 0 min: Briefing for removal of Rotating Service Structure
L-9 hr 00 min: Briefing for external tank fuel loading
L-4 hr 30 min: Briefing for Space Shuttle Launch Director
L-3 hr 55 min: Briefing for astronauts
L-2 hr 10 min: Briefing for Flight Director
L-0 hr 35 min: Briefing for launch and RTLS
L-0 hr 13 min: Poll all weather constraints

The basic weather launch commit criteria on the pad at liftoff must be:

Temperature: Prior to external tank propellant loading, tanking will not begin if the 24 hour average temperature has been below 41 degrees.

After tanking begins, the countdown shall not be continued nor the Shuttle launched if:

a.) the temperature exceeds 99 degrees for more than 30 consecutive minutes.

b.) the temperature is lower than the prescribed minimum value for longer than 30 minutes unless sun angle, wind, temperature and relative humidity conditions permit recovery. The minimum temperature limit in degrees

F. is specified by the table below and is a function of the five minute average of temperature, wind and humidity. The table becomes applicable when the observed temperature reaches 48 degrees. In no case may the Space Shuttle be launched if the temperature is 35 degrees or colder.

Wind Speed	**Relative Humidity**				
(kts)	0-64%	65-74%	75-79%	80-89%	90-100%
0 - 1	48	47	46	45	44
2	47	46	45	44	43
3	41	41	41	40	39
4	39	39	39	39	38
5 - 7	38	38	38	38	38
8 - 14	37	37	37	37	37
>14	36	36	36	36	36

The above table can be used to determine when conditions are again acceptable for launch if parameters have been out of limits for thirty minutes or less. If longer than thirty minutes, a mathematical recovery formula of the environmental conditions is used to determine if a return to acceptable parameters has been achieved. Launch conditions have been reached if the formula reaches a positive value.

Wind: Tanking will not begin if the wind is observed or forecast to exceed 42 knots for the next three hour period.

For launch the wind constraints at the launch pad will vary slightly for each mission. The peak wind speed allowable is 30 knots. However, when the wind direction is between 100 degrees and 260 degrees, the peak speed varies for each mission and may be as low as 24 knots.

The upper atmosphere wind profile must conform to either one of two wind loading programs developed by the Johnson Space Center. This profile is determined by a series of Jimsphere wind balloon releases from Cape Canaveral Air Station. A final recommendation is made by the JSC Launch Systems Evaluation Advisory Team (LSEAT) to the KSC launch director at Launch minus 30 minutes. The Space Shuttle will not be launched within 30 minutes of the time a determination has been made that the upper wind profile will adversely affect the performance of the launch vehicle.

A downrange weather advisory shall be issued by the Shuttle Weather Officer to the Mission Management Team for their consideration if the wind in the solid rocket booster recovery area is forecast to exceed 26 knots during retrieval operations. Seas in excess of Sea State 5 (8-13 feet) may also be a factor considered by the Mission Management Team.

Precipitation: None at the launch pad or within the flight path.

Lightning (and electric fields with triggering potential):

- Tanking will not begin if there is forecast to be greater than a 20% chance of lightning within five nautical miles of the launch pad during the first hour of tanking. The launch director with the concurrence of the safety director may make an exception after consultation with the Shuttle Weather Officer.

- Do not launch if lightning has been detected within 10 nautical miles of the pad or the planned flight path within 30 minutes prior to launch. Launch may occur if the source of lightning has moved more than 10 nautical miles away from the pad or the flight path and a field mill, used to measure electric fields, is located within 5 nautical miles of the lightning flash.

- The one-minute average of the electric field mill network may not exceed -1 or +1 kilovolt per meter within five nautical miles of the launch pad or the lightning flash at any time within 15 minutes prior to launch. This field mill criteria becomes -1.5 or + 1.5 kilovolts per meter if there are no clouds within 10 nautical miles of the flight path except those which are transparent. Also excepted are clouds with tops below the 41 degrees F. temperature level that have not have been previously associated with a thunderstorm, or associated with convective clouds having tops above the 14 degrees F. temperature level during the last three hours.

- Do not launch when lightning is observed and the cloud which produced the lightning is within 10 nautical miles of the flight path. Launch may not occur until 30 minutes has elapsed since the lightning flash, or the cloud has moved more than 10 nautical miles away.

Clouds: (types known to contain hazardous electric fields)

- Do not launch if any part of the planned flight path is through a layer of clouds any part of which is within 5 nautical miles is 4,500 feet thick or greater and the temperature of any part of the layer is between 32 degrees F. and -4 degrees F. Launch may occur if the cloud layer is a cirrus-like cloud that has never been associated with convective clouds, is located entirely at temperatures of 5 degrees F. or colder, and shows no evidence of containing water droplets.

- Do not launch through cumulus type clouds with tops higher than the 41 degree F. temperature level. Launch may occur through clouds as cold as 23 degrees F. if the cloud is not producing precipitation, and all field mills within 5 nautical miles of the flight path and at least one field mill within 2 nautical miles of the cloud center read between -100 volts per meter and +500 volts per meter.

- Do not launch 1) through or within 5 nautical miles of the nearest edge of cumulus type clouds with tops higher than the 14 degree F level; 2) through or within 10 nautical miles of the nearest edge of cumulus clouds with tops higher than the -4 degrees F. level.

- Do not launch if the flight path is through any non-transparent clouds that extend to altitudes at or above the 32 degrees F. level which are associated with disturbed weather producing moderate or greater precipitation, or melting precipitation, within five nautical miles of the flight path.

- Do not launch through an attached anvil cloud. If lightning occurs in the anvil or the associated main cloud, do not launch within 10 nautical miles for the first 30 minutes after lightning is observed, or within 5 nautical miles from 30 minutes to 3 hours after lightning is observed.

- Do not launch if the flight path will carry the vehicle:

a.) through non-transparent parts of a detached anvil for the first three hours after the anvil detaches from the parent cloud, or the first four hours after the last lightning occurs in the detached anvil.

b.) within 10 nautical miles of non-transparent parts of a detached anvil for the first thirty minutes after the time of the last lightning in the parent or anvil cloud before detachment, or the detached anvil after its detachment.

c.) within 5 nautical miles of non-transparent parts of a detached anvil for the first three hours after the time of the last lightning in the parent or anvil cloud before detachment, or the detached anvil after detachment, unless there is a field mill within 5 nautical miles of the detached anvil reading less than 1,000 volts per meter for the last 15 minutes and a maximum radar returns from any part of the detached anvil within 5 nautical miles of the flight path have been less than 10 dBZ (light rain) for 15 minutes.

- Do not launch if the flight path will carry the vehicle through a thunderstorm or cumulonimbus debris cloud which is not transparent and less than three hours old. Launch may not occur within five nautical miles of these debris clouds unless: 1) for 15 minutes preceding launch there is at least one working field mill within five nautical miles of the debris cloud; 2) all electric field mill readings are between -1 kilovolt and + 1 kilovolt per meter within five nautical miles of the flight path; 3) no precipitation has been detected in the debris cloud (less

than 10 dbz by radar) within 5 nautical miles of the flight path.

- Do not launch if the flight path will carry the vehicle through any cumulus cloud that has developed from a smoke plume while the cloud is attached to the plume, or for the first 60 minutes after the cumulus cloud detaches from the smoke plume.

Supporting Table: KSC Seasonal Altitudes of Temperature Levels in thousands of feet

January				July			
Temp	**Low**	**Avg**	**High**	**Temp**	**Low**	**Avg**	**High**
-4 F	21 Kft	24 Kft	26 Kft	-4 F	23 Kft	27 Kft	29 Kft
14	13	18	21	14	18	21	23
23	9	15	18	23	16	18	20
32	sfc	12	16	32	13	15	18
41	sfc	9	14	41	10	12	15

Range Safety Cloud Ceiling and Visibility constraints:

- Direct visual observation of the Shuttle is required through 8,000 feet. This requirement may be satisfied using optical tracking sites or a forward observer

- For cloud ceilings of any thickness between 6, 000 feet and 8,000 feet the following conditions must be met for launch to occur:

a.) the vehicle integrity can be observed without interruption through 6,000 feet.

b.) all required Range Safety instrumentation is functioning properly

c.) the U.S. Air Force 45th Space Wing Commander approves the decision to proceed

- For cloud ceilings between 4,000 feet and 6,000 feet the following conditions must be met for launch to proceed:

a.) the thickness of the clouds must be less than 500 feet

b.) the vehicle integrity can be monitored by the Eastern Range airborne and/or the ground forward observers through 8,000 feet

c.) all required Range Safety instrumentation is functioning properly

d.) the U.S. Air Force 45th Space Wing Commander approves the decision to proceed

A **"Good Sense Rule"** is in effect for launch which states:
"Even when constraints are not violated, if any other hazardous conditions exist, the launch weather officer will report the threat to the launch director. The launch director may hold at any time based on the instability of the weather."

CONTINGENCY FLIGHT RULES

Weather criteria for an emergency landing must be considered along with launch criteria since the possibility exists for a Return To Launch Site abort (RTLS), landings at the Trans-Oceanic Abort Landing Sites (TAL), the

Abort Once Around (AOA) sites and the first day Primary Landing Site (PLS). These forecasts are prepared by the NOAA National Weather Service Spaceflight Meteorology Group in Houston and briefed by them to the astronauts, Flight Director and Mission Management Team. All criteria refer to observed and forecast weather conditions except for the first day PLS which is forecast weather only.

- For RTLS with redundant Microwave Landing System (MLS) capability and a weather reconnaissance aircraft, cloud coverage 4/8 or less below 5,000 feet and a visibility of 4 statute miles or greater are required. For AOA and PLS sites, cloud coverage 4/8 or less below 8,000 feet and a visibility of 5 statute miles or greater is required. For TAL sites, cloud coverage 4/8 or less below 5,000 feet and a visibility of 5 statute miles or greater are required.

- For landing on a hard surface runway without redundant Microwave Landing System (MLS) capability all sites require a ceiling not less than 10,000 feet and a visibility of at least 7 statute miles. Landing at night on a lake bed runway may occur if the ceiling is not lower than 15,000 feet and the visibility is 7 miles or greater with at least non-redundant MLS capability .

- For the RTLS site and TAL sites, no thunderstorms, lightning, or precipitation within 20 nautical miles of the runway, or within 10 nautical miles of the final approach path extending outward to 30 nautical miles from the end of the runway.

- An RTLS rule exception may be made for light precipitation within 20 nautical miles of the runway if the specific criteria listed below are met:

a.) The tops of the clouds containing precipitation do not extend into temperature regions colder than 41 (F.); they have not been colder than 14 (F.) within 2.5 hours prior to launch; the radar reflectivity is less than 30 dbz at all levels within and below the clouds.

b.) Precipitation covers less than 10% of the area within 20 nautical miles of the runway, or multiple heading alignment circles are clear of showers.

c.) The movement of the showers is observed to be consistent and no additional convective development is forecast.

d.) Touchdown/rollout criteria and associated navigational aids meet the specified prelaunch go/no go requirements.

If showers exceed either parameter of part a.) above, an RTLS landing may still occur if a 2 nautical mile vertical clearance can be maintained from the top of any shower within 10 nautical miles of the approach paths.

- For RTLS and TAL sites, no detached opaque thunderstorm anvils less than three hours old within 15 nautical miles of the runway, or within 5 nautical miles of the final approach path extending outward to 30 nautical miles from the end of the runway.

- For AOA and PLS sites, no thunderstorms, lightning or precipitation within 30 nautical miles of the runway, or within 20 nautical miles of the final approach path extending to 30 nautical miles from the end of the runway.

- For RTLS and the TAL sites, no detached opaque thunderstorm anvil cloud less than 3 hours old within 15 nautical miles of the runway or within 5 nautical miles of the final approach path extending outward to 30 nautical miles from the end of the runway.

- For AOA and PLS sites, no detached opaque thunderstorm anvil cloud less than 3 hours old within 20 nautical miles of the runway or within 10 nautical miles of the final approach path extending to 30 nautical miles from the end of the runway.

- The RTLS crosswind component may not exceed 15 knots. If the astronaut flying weather reconnaissance in

the Shuttle Training Aircraft executes the approach and considers the landing conditions to be acceptable, this limit may be increased to 17 knots. For the TAL, AOA and PLS sites there is a night-time crosswind limit of 12 knots.

- Headwind: not to exceed 25 knots.

- Tailwind: not to exceed 10 knots average, 15 knots peak.

- Turbulence: conditions must be less than or equal to moderate intensity.

KSC END OF MISSION LANDING WEATHER FLIGHT RULES

The end of mission landing weather forecast is prepared by the NOAA National Weather Service Spaceflight Meteorology Group in Houston for the astronauts, Flight Director and Mission Management Team. All criteria refer to observed and forecast weather conditions. Decision time for the deorbit burn is 70 - 90 minutes before landing. The weather criteria are:

- Cloud coverage of 4/8 or less below 8,000 feet and a visibility of 5 miles or greater required.

- The peak cross wind cannot exceed 15 knots, 12 knots at night. If the mission duration is greater than 20 days the limit is 12 knots, day and night.

- Headwind cannot exceed 25 knots.

- Tailwind cannot exceed 10 knots average, 15 knots peak.

- No thunderstorm, lightning, or precipitation activity is within 30 nautical miles of the Shuttle Landing Facility.

- Detached opaque thunderstorm anvils less than three hours old must not be within 20 nautical miles of the Shuttle Landing Facility, or within 10 nautical miles of the flight path when the orbiter is within 30 nautical miles of the runway.

- Turbulence must be less than or equal to moderate intensity.

- Consideration may be given for landing with a "no go" observation and a "go" forecast if at decision time analysis clearly indicates a continuing trend of improving weather conditions, and the forecast states that all weather criteria will be met at landing time.

WEATHER INSTRUMENTATION

The weather equipment used by the forecasters to develop the launch and landing forecasts is:

-Radar: Launch forecasters located at Cape Canaveral Air Station and landing forecasters located in Houston can access displays from two different radars. One is located at Patrick Air Force Base south of Cocoa Beach. The other is located in Melbourne at the National Weather Service and is a NEXRAD Doppler radar. Each radar provides rain intensity and cloud top information out to a distance as far as 200 nautical miles. The NEXRAD radar can also provide estimates of total rainfall and radial wind velocities.

-Field Mill Network: Thirty-one advanced field mill sites around KSC and Cape Canaveral Air Station provide data on lightning activity and surface electric fields induced by charge aloft. This data helps forecasters determine when electric charge aloft may be sufficient to create triggered lightning during launch, and to determine when to issue and cancel lightning advisories and warnings.

-Lightning Detection System: Detects and plots cloud to ground lightning strikes within 125 nautical miles of the Kennedy Space Center. Location accuracy is optimum within 30 nautical miles. Locations of strikes are color coded according to time of occurrence.

-Lightning Detection And Ranging (LDAR): Developed by NASA at the Kennedy Space Center, LDAR plots intracloud, cloud to cloud and cloud to ground lightning in three dimensions within 100 nautical miles of the Kennedy Space Center. Location accuracy is very high within 25 nautical miles. LDAR data is important in determining the beginning and end of lightning conditions.

- National Lightning Detection Network: Plots cloud to ground lightning nationwide. Used to help ensure safe transit of the Space Shuttle orbiter atop the Shuttle Carrier Aircraft between Edwards Air Force Base in California and the Kennedy Space Center in Florida. It is also used to assess lightning beyond the 125 mile range of the Lightning Detection System.

-Rawinsonde: A balloon with a tethered instrument package which radios its altitude to the ground together with temperature, dewpoint and humidity, wind speed and direction, and pressure data. Rawinsondes reach altitudes exceeding 100,000 feet.

-Jimsphere balloon: A reflective balloon made of mylar tracked by radar which provides highly accurate information on wind speed and wind direction up to 60,000 feet.

- Doppler Radar Wind Profiler: Measures upper level wind speed and direction over Kennedy Space Center from approximately 10,000 feet to 60,000 feet. The data, received every 5 minutes, is used to ensure the upper winds used to calculate wind loads on the shuttle vehicle have not significantly changed between balloon soundings. If data from the Doppler Radar Wind Profiler indicates a possible significant change, another Jimsphere balloon is released.

-Rocketsonde: A 12-foot-tall instrumented rocket is launched on L-1 day which senses and transmits data on temperature, wind speed and direction, wind shear, pressure, and air density at altitudes between 65,000 feet and 370,000 feet. A four-inch in diameter solid rocket motor separates at an altitude of about 5,000 feet, after which an "instrumented dart" coasts to apogee.

-Satellite Images and Data: Provided directly to the satellite terminal at USAF Range Weather Operations and NOAA National Weather Service Space Flight Meteorology Group in Houston by the geostationary GOES weather satellites. In addition high resolution images are received from spacecraft in low earth orbit including both the NOAA and the Defense Meteorological Support Program (DMSP) polar orbiting satellites.

-Meteorological Interactive Data Display System (MIDDS): Integrates diverse weather data on a single display terminal-- satellite images, radar, computer generated graphics of surface and upper air map features, numerical weather models, current weather observations, data from meteorological towers, lightning strikes and field mill information.

- Towers: 33 meteorological towers are located on Kennedy Space Center and Cape Canaveral Air Station, including two at each launch pad and three at the Shuttle Landing Facility. In addition to wind, most towers are also instrumented with temperature, and moisture sensors. The 60-foot towers at the launch pads and the 33-foot towers at the Shuttle Landing Facility are closely monitored for launch and landing criteria. In addition, on the mainland, there is a network of 19 wind towers which extend outward an additional twenty miles. Tower data is an important short-term forecasting tool and also helps determine the direction and distance of toxic corridors in the event of a mishap.

-Buoys: Meteorological buoys are anchored 20 and 110 nautical miles east-northeast of Cape Canaveral. These buoys relay hourly measurements via satellite of temperature, wind speed and direction, barometric pressure, precipitation, sea water temperature, and wave height and period. Buoy data is used for launch, landing, booster retrieval, and daily ground processing forecasts for the Kennedy Space Center and Cape Canaveral Air Station.

-Solid Rocket Booster Retrieval Ships: These vessels radio observed weather conditions and sea state from the booster impact area located up to 150 nautical miles downrange.

-Weather Reconnaissance Aircraft: A T-38 jet and the Shuttle Training Aircraft are flown by a weather support astronaut.

For automatic e-mail subscriptions to this daily Shuttle status report or KSC-originated press releases, send an Internet electronic mail message to domo@news.ksc.nasa.gov. In the body of the message (not the subject line) type the words "subscribe shuttle-status", or "subscribe ksc-press-release" (do not use quotation marks). The system will reply with a confirmation via e-mail of each subscription.

NASA News Release
ON LINE
JOHN F. KENNEDY SPACE CENTER

December 13, 1999
KSC Contact: Joel Wells
KSC Release No. 151-99

LAUNCH COUNTDOWN FOR STS-103 SET TO BEGIN DECEMBER 14

NASA will begin the countdown for launch of Space Shuttle Discovery on mission STS-103 on Dec. 14 at 1:30 a.m. EST at the T-43 hour mark. The KSC launch team will conduct the countdown from Firing Room 1 of the Launch Control Center.

The countdown includes 24 hours and 48 minutes of built-in hold time leading to a liftoff on Dec. 16. The launch window opens at 9:18 p.m. and extends for 41 minutes.

This is the third and final mission of 1999. Mission STS-103 marks the 27th flight of orbiter Discovery and the 96th flight overall in Space Shuttle history. STS-103 is slated to last 9 days, 21 hours. Discovery returns to KSC's Shuttle Landing Facility at about 6:56 p.m. EST on Sunday, Dec. 26.

Mission STS-103 is designed to replace worn parts on the 9-year-old Hubble Space Telescope and to upgrade other systems on the space observatory. All of the six gyroscopes that provide Hubble's pointing capability will be replaced on orbit along with other equipment like a guidance sensor and main computer. Four spacewalks are planned to support this flight.

Discovery rolled out of Kennedy Space Center's Orbiter Processing Facility bay 1 on Nov. 4 and was mated to the external tank and solid rocket boosters in the Vehicle Assembly Building. As a precaution, Shuttle managers opted to change-out Discovery's No. 3 main engine in the VAB. A small drill bit had broken off in the engine's coolant cavity during routine processing several months earlier. On Nov. 13, the fully assembled Space Shuttle lumbered out of the VAB atop the crawler transporter en route to Launch Pad 39B.

Once at the pad, workers resumed routine processing activities along with thorough wiring inspections at the orbiter/external tank umbilical and aft engine compartment. Wiring repairs were effected as required. Replacement of a dented liquid hydrogen recirculation line in Discovery's engine compartment was also required in addition to standard processing.

The STS-103 crew consists of: Commander Curt Brown, Pilot Scott Kelly, Mission Specialists Steve Smith, Michael Foale, John Grunsfeld, Claude Nicollier (ESA) and Jean-Francois Clervoy (ESA). The crew arrived at KSC at about 8:20 p.m., Monday, December 6. Their activities at KSC prior to launch include crew equipment fit checks, medical examinations and opportunities to fly in the Shuttle Training Aircraft.

(end of general release)

COUNTDOWN MILESTONES
*all times are Eastern

Launch - 2 Days (Tuesday, Dec. 14)

- Prepare for the start of the STS-103 launch countdown
- Perform the call-to-stations (1 a.m.)
- All members of the launch team report to their respective consoles in Firing Room 1 in the Launch Control Center for the start of the countdown
- Countdown begins at the T-43 hour mark (1:30 a.m.)
- Begin final vehicle and facility close-outs for launch
- Load backup flight system software into Discovery's general purpose computers
- Inertial measurement unit checks (12 p.m.)
- Navigation aids activated and tested (2:30 p.m.)
- Preparation to load power reactant storage and distribution system complete (4:30 p.m.)

Enter first planned built-in hold at T-27 hours for duration of four hours (5:30 p.m.)

- Clear launch pad of all non-essential personnel
- Perform test of the vehicle's pyrotechnic initiator controllers (6:30 p.m.)
- Open launch pad to personnel supporting PRSD load

Resume countdown (9:30 p.m.)

- Begin operations to load cryogenic reactants into Discovery's fuel cell storage tanks (9:30 p.m. - 5:30 a.m.)

Launch - 1 Day (Wednesday, Dec. 15)

Enter four-hour built-in hold at T-19 hours (5:30 a.m.)

- Demate orbiter mid-body umbilical unit and retract into fixed service structure (6 a.m.)
- Resume orbiter and ground support equipment close-outs

Resume countdown (9:30 a.m.)

- Start final preparations of the Shuttle's main engines for propellant tanking and flight
- Begin Mission Specialist seat installation and cable routing verifications (11:30 a.m.)
- Close-out the tail service masts on the mobile launcher platform (4:30 p.m.)

Enter planned hold at T-11 hours for 12 hours, 58 minutes (5:30 p.m.)

- Begin startracker functional checks
- Activate orbiter's inertial measurement units (7 p.m.)
- Activate the orbiter's communications systems (8:30 p.m.)
- Install film in numerous cameras on the launch pad (9:30 p.m.)
- Flight crew equipment late stow begins (10 p.m.)
- Fill pad sound suppression system water tank

Launch Day (Thursday, Dec. 16)

- Safety personnel conduct debris walk down
- Move Rotating Service Structure (RSS) to the park position (2:30 a.m.)
- Perform orbiter ascent switch list in crew cabin
- Start fuel cell flow-through purge (5:30 a.m.)

Resume countdown (6:28 a.m.)

- Activate the orbiter's fuel cells (7:38 a.m.)
- Configure communications at Mission Control, Houston, for launch
- Clear the blast danger area of all non-essential personnel
- Switch Discovery's purge air to gaseous nitrogen (8:43 a.m.)

Enter planned one-hour built-in hold at the T-6 hour mark (11:28 a.m.)

- Launch team verifies no violations of launch commit criteria prior to cryogenic loading of the external tank
- Clear pad of all personnel

Resume countdown (12:28 p.m.)

- Begin loading the external tank with about 500,000 gallons of cryogenic propellants (about 12:28 p.m.)
- Complete filling the external tank with its flight load of liquid hydrogen and liquid oxygen propellants (about 3:28 p.m.)

Enter planned two-hour built-in hold at T-3 hours (3:28 p.m.)

- Inertial measurement unit preflight calibration complete (3:48 p.m.)
- Align Merritt Island Launch Area (MILA) tracking antennas
- Close-out crew and Final Inspection Team proceed to Launch Pad 39B

Resume countdown at T-3 hours (5:28 p.m.)

- Launch Director weather briefing (7:48 p.m.)
- Perform open loop test with Eastern Range
- Crew departs Operations and Checkout Building for the pad (about 5:33 p.m.)
- Complete close-out preparations in the white room
- Check cockpit switch configurations
- Flight crew begins entry into the orbiter (about 6:03 p.m.)
- Astronauts perform air-to-ground voice checks with Launch Control and Mission Control
- Close Discovery's crew hatch (about 7:18 p.m.)
- Perform hatch seal and cabin leak checks
- Complete white room close-out
- Close-out crew moves to fallback area

Enter planned 10-minute hold at T-20 minutes (8:08 p.m.)

- NASA Test Director conducts final launch team briefings
- Complete inertial measurement unit pre-flight alignments

Resume countdown (8:18 p.m.)

- Transition the orbiter's onboard computers to launch configuration
- Start fuel cell thermal conditioning
- Close orbiter cabin vent valves
- Transition backup flight system to launch configuration

Enter planned 40-minute hold at T-9 minutes (8:29 p.m.)

- Launch Director, Mission Management Team and NASA Test Director conduct final polls for go/no go to launch

Resume countdown at T-9 minutes (9:09 p.m.)

- Start automatic ground launch sequencer (T-9:00 minutes)
- Retract orbiter crew access arm (T-7:30)
- Start mission recorders (T-6:15)
- Start Auxiliary Power Units (T-5:00)
- Arm SRB and ET range safety safe and arm devices (T-5:00)
- Start liquid oxygen drainback (T-4:55)
- Start orbiter aerosurface profile test (T-3:55)
- Start main engine gimbal profile test (T-3:30)
- Pressurize liquid oxygen tank (T-2:55)
- Begin retraction of the gaseous oxygen vent arm (T-2:55)
- Fuel cells to internal reactants (T-2:35)
- Pressurize liquid hydrogen tank (T-1:57)
- Deactivate SRB joint heaters (T-1:00)
- Orbiter transfers from ground to internal power (T-0:50 seconds)
- Ground Launch Sequencer go for auto sequence start (T-0:31 seconds)
- SRB gimbal profile (T-0:21 seconds)
- Ignition of three Space Shuttle main engines (T-0:6.6 seconds)
- SRB ignition and liftoff (T-0)

SUMMARY OF BUILT-IN HOLDS FOR STS-103			
T-TIME	**LENGTH OF HOLD**	**HOLD BEGINS**	**HOLD ENDS**
T-27 hours	4 hours	5:30 p.m. Tues.	9:30 p.m. Tues.
T-19 hours	4 hours	5:30 a.m. Wed.	9:30 a.m. Wed.
T-11 hours	12 hours, 58 minutes	5:30 p.m. Wed.	6:28 a.m. Thurs.
T-6 hours	1 hour	11:28 a.m. Thurs.	12:28 p.m. Thurs.
T-3 hours	2 hours	3:28 p.m. Thurs.	5:28 p.m. Thurs.
T-20 minutes	10 minutes	8:08 p.m. Thurs.	8:18 p.m. Thurs.
T-9 minutes	40 minutes	8:29 p.m. Thurs.	9:09 p.m. Thurs.

CREW FOR MISSION STS-103	
POSITION	**NAME**
Commander (CDR)	Curt Brown
Pilot (PLT)	Scott Kelly
Mission Specialist (MS1)	Steve Smith
Mission Specialist (MS2)	Jean-Francois Clervoy
Mission Specialist (MS3)	John Grunsfeld
Mission Specialist (MS4)	Michael Foale

Mission Specialist (MS5)	Claude Nicollier

SUMMARY OF STS-103 LAUNCH DAY CREW ACTIVITIES Thursday, December 16	
11:30 a.m.	Crew wake up
1:00 p.m.	Breakfast
4:23 p.m.*	Lunch/Photo opportunity
4:53 p.m.	CDR, PLT, MS2 weather briefing
4:53 p.m.	MS1, MS3, MS4, MS5 don launch and entry suits
5:03 p.m.*	CDR, PLT, MS2 don launch and entry suits
5:33 p.m.*	Depart for Launch Pad 39B
6:03 p.m.*	Arrive at white room and begin ingress
7:18 p.m.*	Close crew hatch
9:18 p.m.*	Launch

*Televised events (times may vary slightly)
All times Eastern

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

December 20, 1999
KSC Contact: Joe Gordon
KSC Release No. 152-99

KENNEDY SPACE CENTER REALIGNS FOR THE FUTURE

Center Director Roy Bridges today will present a top-level look at the new KSC 2000 Reorganization to a civil service workforce audience at 1 p.m. in the KSC Visitor Complex Universe Theater. The presentation will be televised center-wide on closed-circuit television.

"We have eight objectives for meeting our commitments to fly safely while positioning our workforce to add more value for current and future programs," said Bridges.

Based on input from the reorganization team Bridges formed in late August, the center's senior management team decided on a new overall structure. Bridges will present a summary of the general functions of each new organizational unit. He said that specific employee assignments will not be decided until February 2000. Initial planning is scheduled to be complete in late February with announcement of the complete KSC 2000 organization structure in late March followed by implementation in April. At that time, more detailed information regarding the reorganization will be released.

Bridges said the driving forces for the change is a structure more than 30 years old, which has worked well, but needs an update to effectively handle the center's complex current and future agency assignments. In addition, he said that a reduced workforce has left KSC with critical skill shortages, and that we must provide exciting challenges to attract, develop and retain a highly competent, diverse, agile and flexible workforce. Bridges added, "None of the center's approximately 1,665 full-time, permanent civil service employees will lose his or her civil service status because of the reorganization, but some people will have new opportunities within the new structure."

Note to editors: News media may monitor Bridges' presentation from the KSC Press Site News Center. KSC media facilities will continue to receive STS-103 mission programming.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

December 21, 1999
KSC Contact: Lisa Malone
KSC Release No. 153-99

SANTA TO CHECK OUT NEW VEHICLE HANGAR AT SHUTTLE RUNWAY

Sleigh Commander Considers Hangar Rest Stop For Next Year

The Kennedy Space Center's Shuttle Landing Facility (SLF) is preparing for a visitor on Christmas Eve. Rumors are strong that Santa Claus may fly by the landing strip to check on the progress of the $8 million Reusable Launch Vehicle (RLV) Support Complex currently under construction.

The groundbreaking took place on Dec. 18, 1998, just before Santa's visit last year. The sweeping curve of the facility's roof is plainly visible now to the center's employees from State Road 3.

Located on the tow-way at the south end of the SLF, the complex will include a multi-purpose RLV hangar and adjacent facilities for related ground support equipment and administrative/technical support. Intended to support the Space Shuttle and other RLV and X-vehicles, the new complex is jointly funded by NASA's Space Shuttle Program, KSC and the Spaceport Florida Authority. The complex is scheduled for completion by mid-2000, in time to support possible test flights of the X-34 RLV technology demonstrator and other future vehicles.

Santa is particularly interested in anything that has to do with reusable launch vehicles since, technically, his sleigh falls into that category of transportation. It has been upgraded with state-of-the-art precision landing equipment compatible with the Tactical Air Navigation (TACAN) system and Microwave Scanning Beam Landing System (MSBLSS) in place at the runway for use during Space Shuttle landings. However, Santa still relies on the tried-and-true reindeer propulsion system he has always used to deliver presents to good children worldwide every holiday season.

These automated landing systems will be left on in the automatic mode at both the SLF and the Skid Strip at Cape Canaveral Air Station when the facilities close down for the holidays. "No government expense is involved in leaving these landing strips ready to support any emergency Santa may experience while in the Central Florida area," said Bill Plutt, the Airfield Services Manager for Space Gateway Support. "We're glad to continue this tradition that started shortly after the opening of the SLF in the 1970s."

Special care will be taken to inspect the runway prior to Discovery's planned landing

on Dec. 27 at the conclusion of STS-103, the third Hubble Space Telescope servicing mission. Although it has never been confirmed that Santa has made a pit stop at KSC, a routine sweep of the runway to remove debris after the holidays last year produced one defective sleigh bell, some tattered red ribbon, and a pile of what appeared to be cookie crumbs.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

December 28, 1999
KSC Contact: Bruce Buckingham
KSC Release No. 154-99

KSC ENDS ANOTHER YEAR SUCCESSFULLY AND GREETS THE NEXT MILLENNIUM WITH A FULL SLATE OF ACTIVITIES

During 1999, Kennedy Space Center continued its tradition of excellence as the nation's launch site for manned missions and in its development as a Spaceport Technology Center. Here are some of the highlights of the year:

Kennedy Space Center celebrated the 30th Anniversary of the launch of Apollo 11 and man's first footsteps on the moon. Building on such past successes, the KSC Team during the past year paved the way for treks even farther from home and prepared elements for NASA's new outpost in space.

Astronauts outfitted and prepared that outpost, the International Space Station, for occupancy during a supply mission launched from KSC in May. The Chandra X-ray Observatory was launched in July.

KSC's most recent launch, the Third Hubble Telescope Servicing Mission on Dec.19, set into motion the repair and improvement of the Hubble Space Telescope. The servicing mission will allow the observatory to continue providing us with spectacular visions of the cosmos for another decade.

Orbiters launched by the KSC Team carried 19 crew members into space, logged more than 9 million miles and carried many major payloads into orbit. In addition, KSC coordinated the launch of ten expendable launch vehicle (ELV) missions during the past year.

Eight Shuttle missions and 13 ELV missions are currently scheduled for 2000.

Preparing for a new millennium of space exploration, KSC provided significant research and development support for work on new space vehicles. The center's leadership also began positioning the spaceport for the future through a reorganization effort called KSC 2000. The reorganization is designed to make better use of resources and allow KSC to participate in NASA's cutting edge engineering initiatives, such as the Mars Ascent Vehicle.

KSC will begin the new century with a new area code - 321 - chosen because of the area's 50-year launch history. In honor of the change, Florida Governor Jeb Bush and KSC Director Roy Bridges initiated on November 1 a video teleconference call to KSC's Deputy Director for Business Operations Jim Jennings.

Center Director Roy Bridges continued to lead the way in keeping safety and health

as the center's No. 1 priority by initiating a series of safety "walkdowns" designed to detect and resolve problems that could lead to accidents or failures. KSC again held a centerwide Super Safety Day, one full day devoted to safety awareness and education.

Among KSC's other accomplishments during 1999:

Advanced Development and Shuttle Upgrades

Major upgrades to Atlantis, including a "glass cockpit," were unveiled in April. Among 130 modifications made during the ten months the orbiter was off-line: The replacement of outdated electromechanical cockpit displays with 11 full-color flat panel screens. Other improvements included an Integrated Vehicle Health Management System, which monitors the Shuttle's health while on orbit through a network of hi-tech sensors placed throughout the orbiter.

As a result of an electrical short on mission STS-93, a vast electrical inspection commenced for the entire orbiter fleet. These inspections were recently completed on the orbiter Discovery, prior to its recent mission STS-103. Similar work is virtually complete on Endeavour as it is prepared for the first mission of 2000, STS-99. Atlantis will have its inspections conducted prior to its next scheduled mission.

Columbia, the oldest of the four orbiters in NASA's fleet was sent to Palmdale, CA, in September for a nine-month overhaul after the Chandra mission. Workers are performing more than 100 modifications on the vehicle and they will conduct extensive electrical inspections before returning the vehicle to KSC next year.

Shuttle Mission Highlights

Three Shuttle missions were launched in 1999, starting with STS-96 in May. The mission marked the first visit to a new star on our horizon, the International Space Station. Space Shuttle Discovery's international crew of seven spent six days preparing and outfitting the station with 5,000 pounds of cargo. It's now ready for the arrival of its early living quarters -- the Russian-built Service Module.

STS-93, launched in July, was the first Space Shuttle mission commanded by a woman, Eileen Collins. Columbia carried the Chandra X-ray Observatory into space. Because of Chandra's ability to detect X-rays, scientists around the world are getting new perspectives on some of the most distant, powerful and dynamic objects in the universe.

During STS-103 the crew of Space Shuttle Discovery upgraded and repaired the Hubble Space Telescope. The 9-year-old observatory was shut down temporarily in November when the fourth of its six gyroscopes failed.

The gyroscopes are part of the system that keeps Hubble pointed in the right direction. This servicing mission originally was scheduled for June 2000, but after the third of Hubble's six gyroscopes failed, it was split into two separate missions. Because of the installation of new gyroscopes, Hubble will soon be back in business again.

All three 1999 Shuttle missions ended with nighttime landings at KSC.

Expendable Launch Vehicles

As lead center for NASA's acquisition and management of expendable launch vehicle launch services, KSC enjoyed a second successful year.

KSC's Expendable Launch Vehicle team supported many major missions carrying NASA payloads launched from Cape Canaveral Air Station - including the Mars Surveyor in January, Stardust spacecraft in February and the Far Ultraviolet Spectroscopic Explorer (FUSE) spacecraft in June.

From Vandenberg Air Force Base in California, the KSC expendable launch team supported the successful launch of ARGOS in February, the Wide-Field Infrared Explorer (WIRE) spacecraft in March, Landsat 7 in April, the TERRIERS satellite in May, the Quick Scatterometer (QuikSCAT) mission in June, and the Terra and AcrimSat spacecraft in December.

A contract award to launch the Vegetation Canopy Lidar (VCL) satellite on an Athena I rocket from a launch pad located on Kodiak Island, Alaska, was announced in April. The scheduled launch will be the first to low Earth orbit from the Alaska Aerospace Development Corporation's new commercial launch facility.

International Space Station

The Italian Space Agency's "Raffaello" Multi-Purpose Logistics Module , the second of three Italian modules for the International Space Station arrived at KSC in August. The reusable logistics carrier was transported to the United States by a special Airbus "Beluga" air cargo plane from the factory of Alenia Aerospazio in Turin, Italy.

The International Space Station truss, which will become the backbone of the orbiting International Space Station (ISS), arrived at KSC in June after having been completed by a division of the Boeing Company in Huntington Beach, CA.

The Canadian Space Agency's first contribution to the International Space Station, the 56-foot-long Space Station Remote Manipulator System, was delivered to KSC in May. The arm is the primary means of transferring payloads between the orbiter payload bay and the station for assembly.

A series of Multi-element Integration Tests on International Space Station components were held during the year to help avoid problems that would be costly to address in space.

Reusable Launch Vehicles

NASA engineering technicians from KSC's Engineering Prototype Lab assisted Orbital Sciences Corporation and NASA's Dryden Flight Research Center in the complex process of converting the X-34 A-1 vehicle from captive carry status to unpowered flight status. The X-34 is a reusable launch vehicle technology demonstrator and the modified vehicle is now known as A-1A.

A team of Kennedy Space Center experts designed, fabricated and tested the X-33 umbilical system and delivered the finished products to Lockheed Martin in July. Under construction at Lockheed Martin Skunk Works in Palmdale, CA, X-33 is a half-scale prototype of the planned operational reusable launch vehicle dubbed VentureStar.

Contracts and Facilities

KSC marked its first full year under its Joint Base Operations and Support Contract (J-BOSC). Through J-BOSC, a single set of base operations and support service requirements have been established for KSC, Cape Canaveral Air Station and Patrick Air Force Base, collectively known as Cape Canaveral Spaceport. Eighteen different contractors, often with overlapping and duplicate responsibilities, previously performed these services. Vice President Gore recognized the partnership between the KSC and the Air Force with the Hammer Award.

The LC-39 Emergency Power Plant went online with a grand opening in July. The plant provides the Launch Complex-39 area with increased reliability, double power capacity and saves about $770,000 every year in the process. The new control system allows NASA to participate in the Commercial Industrial Load Control program offered by Florida Power & Light (FPL), by using the new plant to reduce KSC's electrical demand on FPL's power grid during peak periods. In turn, FPL charges KSC a lower billing rate which translates into hundreds of thousands in annual cost savings.

The 14,000-square-foot NASA Technical Records Center opened in September, solving several space issues for NASA and Boeing through an innovative agreement and excellent teamwork. Boeing gained the space they needed to support their new Delta IV program and NASA gained a new records storage site.

One of two Kennedy Space Center high-altitude chambers formerly used to test Apollo Program flight hardware was reactivated in February for use in leak testing International Space Station pressurized modules.

To better safeguard Space Shuttle assemblies and keep assembly procedures on track, the Vehicle Assembly Building (VAB) is being outfitted with a third stacking area. The new area, in high bay 2, will allow NASA to preassemble stacks and still have room in the VAB to pull a Shuttle back from the pad if severe weather threatens. In addition, workers will restore the Apollo-era crawlerway, offering greater flexibility in rolling an orbiter back from the pad and into the building during hurricane season.

Tourist Destination Upgrades

A new entryway to the KSC Visitor Center and several new educational presentations opened in April. The $13 million expansion, which was opened to the public earlier this month, includes a new International Space Station-themed ticket plaza, the new Universe Theater with "Quest for Life," and the Robot Scouts exhibit.

Community Outreach and Education

KSC's contributions through the 1999 Combined Federal Campaign exceeded its goal of $216,000 by 14 percent, with more than $245,644 given by KSC Civil Service employees.

KSC Director Roy D. Bridges, Jr., and other KSC senior managers met with business and government leaders from Brevard County and the State of Florida at the annual Community Leaders Breakfast in June. The KSC leadership presented projections for future plans of America's space program and the economic impact these plans may have in the local community.

Thirteen Brevard County schools received 81 excess contractor computers valued in

excess of $90,000 through efforts lead by NASA's K-12 Education Services Office at Kennedy Space Center. The Astronaut Memorial Foundation was a strategic partner in the effort. Former USBI employees volunteered to put the computers into working order.

KSC participated in the NASA-wide sponsorship of the Summer High School Apprenticeship Research Program. The program is a mentor-based, 8-week program for underrepresented students with NASA scientists, engineers and other research specialist serving as professional role models.

The FIRST robotics competition was hosted at KSC Visitor Center in March through the cooperation of NASA, KSC contractor organizations and the surrounding communities. FIRST's goal is to expose students to engineering, help them discover the important connection between classroom lessons and real-world applications and inspire kids to want to learn more. Brevard County high schools participating in the regional event include Titusville, Astronaut, Cocoa Beach, Merritt Island, Rockledge, and Satellite Beach.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

May 13, 1999
JSC Contact: James Hartsfield
JSC Release No. J99-16

SPACE SHUTTLE LAUNCH ADVISORY: DISCOVERY LAUNCH POSTPONED TO REPAIR FUEL TANK HAIL DAMAGE

Space Shuttle managers today postponed the launch of Discovery for at least one week to permit technicians to repair foam insulation on the external fuel tank that was damaged by a severe hail storm last weekend.

Previously scheduled for May 20, Discovery's launch on Shuttle mission STS-96 will be delayed for a minimum of at least a week to no earlier than May 27. Managers will schedule a new target launch date once the repairs are nearing completion, probably by the middle of next week.

Discovery will be moved from the launch pad back to the Vehicle Assembly Building at the Kennedy Space Center to allow repair workers to gain access to some areas of the tank that cannot be reached at the pad. The hail storm caused several small indentations in the tank's foam insulation and managers are concerned that the areas could form ice when the tank is filled with super-cold propellants for launch. Such areas of ice could cause debris damage to the Shuttle after liftoff. Similar repairs to the external fuel tank's foam insulation were performed once before, prior to Shuttle mission STS-70 in July 1995.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

January 20, 1999
KSC Contact: Joel Wells
Release No. N99-4

Note to Editors:
NASA ANNOUNCES DELAY IN SHIPMENT OF CHANDRA OBSERVATORY

NASA today announced that it will delay this month's planned shipment of its Chandra X-ray Observatory from prime contractor TRW Space and Electronics Group, Redondo Beach, CA, to NASA's Kennedy Space Center , FL. The postponement will allow TRW to evaluate and correct a potential problem with several printed circuit boards in the observatory's command and data management system.

TRW notified NASA of the potential problem last week after another spacecraft being built by the company experienced a failure during testing that was attributed to similar printed circuit boards. The failed boards and those in Chandra were all made by BF Goodrich Aerospace, Davis Systems Div., Albuquerque, NM, in the same time frame in 1996. The problem has been traced to poor conductivity between different layers of the boards.

The boards are used in Chandra's main command and telemetry unit and four remote units. These units provide command and data communications links between the observatory's computer and subsystems.

NASA has directed TRW to remove and replace the boards in the main unit, and to conduct further tests and evaluation to determine if it is also necessary to replace the boards in the remote units. The repair, if limited to boards in the main command and telemetry unit, is expected to delay shipment to Kennedy by approximately one week. This will result in approximately a five-week slip in the observatory's launch readiness date, which will allow for integration and testing of the units at Kennedy. If boards in the remote units must also be replaced, a more extensive slip is anticipated.

Go to the *KSC Press Releases* Home Page

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

May 25, 1999
KSC Contact: Bruce Buckingham
Release No. N99-32

NASA TO NAME KSC PRESS SITE AUDITORIUM FOR JOHN HOLLIMAN

The Kennedy Space Center's Press Site auditorium will be named the John Holliman Auditorium to honor the late CNN national correspondent for his enthusiastic, dedicated coverage of America's space program.

NASA Administrator Daniel S. Goldin will formally dedicate the auditorium in Holliman's memory at a ceremony at 9 a.m. EDT on May 27, 1999. Also participating in the dedication will be Dianne Holliman, John Holliman's widow, and Tom Johnson, CNN News Group Chairman, President and CEO.

"John Holliman was excited about the space program, and he easily conveyed that excitement to his viewers," Goldin said. "He held us accountable when we had problems, but he also understood the importance of overcoming obstacles and discovering the unknown."

"I know that John would be absolutely delighted with having the Kennedy Space Center's press auditorium named after him, given his passion for covering the U.S. space program and his dedication to journalism," Johnson said. "I can think of no one else more deserving of this honor. John's energy and curiosity made him a first-rate reporter, and his love for his work was matched only by his unending love and loyalty to his family and friends."

The auditorium was built in 1980 and since then has been the focal point for news coverage of Space Shuttle launches.

NASA News Release ON LINE

JOHN F. KENNEDY SPACE CENTER

July 13, 1999
KSC Contact: Lisa Malone
Note to Editors: N39-99

ARMSTRONG AND ALDRIN TO MEET PRESS IN FLORIDA

Neil Armstrong and Buzz Aldrin, the first two humans to set foot on the moon, will participate in a press availability session with other Apollo-era astronauts on Friday, July 16. The event will be held at 5:30 p.m. EDT at NASA's Kennedy Space Center, FL, as part of activities commemorating the 30th anniversary of their stunningly successful Apollo 11 mission. The list of other participants is still being finalized, but may include: Eugene Cernan, Walter Cunningham, Charles Duke, Walter Schirra, Alfred Worden and John Young.

The session will be carried live on NASA Television, but will not provide for question-and-answer capability from other NASA centers. For information on press credentials, call the Kennedy newsroom on 407/867-2468. NASA Television is available on transponder 9C of the GE-2 satellite at 85 degrees West longitude, vertical polarization, frequency 3880 MHz, audio of 6.8 MHz.

Later that evening the Apollo 11 Commemoration Association is sponsoring a dinner at the Kennedy Apollo/Saturn V Center for former employees who worked on the Apollo program. More information on anniversary events in Florida can be found on the Internet at:

http://www.hq.nasa.gov/office/pao/History/ap11ann/events.htm

An additional advisory listing other events relating to the Apollo 11 30th anniversary will be issued this week.

NASA Facts

National Aeronautics and
Space Administration

John F. Kennedy Space Center
Kennedy Space Center, Florida 32899
AC 407 867-2468

November 1999
KSC Release No. 134-99

STS-103/Discovery

Ensuring the Hubble Space Telescope's Health for the Future

The crew of Space Shuttle Discovery will tune-up the Hubble Space Telescope on a mission that will close out an impressive century of space flight and ensure that Hubble's revolutionary discoveries can continue into the new millennium.

Space Shuttle flight STS-103, the third Hubble Space Telescope servicing mission, is designed to upgrade the 9-year-old observatory and replace worn parts. Four spacewalks are planned during the flight. This servicing mission originally was scheduled for June 2000, but after the third of Hubble's six gyroscopes failed, it was split into two separate missions. Discovery will fly the first, scheduled for Dec. 2, 1999, with the second to follow in 2001.

The gyroscopes, which are part of Hubble's pointing system, measure attitude when Hubble is changing its pointing from one target to another, and they help control the telescope's pointing while observing targets. Three working gyroscopes are needed to meet the telescope's precise pointing requirements.

During the mission, all six of Hubble's gyroscopes will be replaced. In addition, the crew will replace other equipment, including a guidance sensor and the spacecraft's main computer. The new computer, which is 20 times faster with six times more memory than Hubble's original computer, will reduce flight software maintenance and significantly lower costs.

In addition, a voltage/temperature kit will be installed to protect spacecraft batteries from overcharging and overheating when the spacecraft goes into safe mode. A new transmitter will replace a failed spare currently aboard the spacecraft, and a spare solid state recorder will be installed to allow efficient handling of high-volume data. Telescope insulation that has degraded will be replaced. The insulation is necessary to control the internal temperature on the Hubble.

Because of periodic servicing missions planned throughout Hubble's 20-year mission lifespan, the observatory has and will continue to benefit from technological advances. The Hubble Space Telescope is the first observatory designed for extensive maintenance and refurbishment in orbit. Features such as handrails and foot restraints are built into the telescope to help astronauts perform servicing tasks in the Shuttle cargo bay as they orbit Earth at 17,500 mph.

The mission will be led by Commander Curtis L. Brown Jr. (Lt. Col., U.S. Air Force). Scott J. Kelly (Lt. Cmdr., U.S. Navy) will serve as Pilot and Steven L. Smith as Payload Commander. Mission Specialists are C. Michael Foale, Ph.D., John M. Grunsfeld, Ph.D., Claude Nicollier (Capt., Swiss Air Force) of the European Space Agency and Jean-Francois Clervoy, European Space Agency.

To prepare for their mission, the seven-member Discovery crew members trained extensively. Training

for Brown and Kelly focused on rendezvous and proximity operations, such as retrieval and deployment of the telescope. Mission Specialists Smith, Foale, Grunsfeld and Nicollier trained for the multiple spacewalks required during the mission. As principal operator of the robotic arm, Clervoy practiced specifically for capture and redeployment of the telescope, rotation and pivoting of the telescope on the Flight Support System, and related contingencies.

STS-103 is the 96th Space Shuttle mission and the 27th flight of Discovery. The Space Shuttle will lift off from Launch Pad 39B. The orbital insertion altitude will be 317 nautical miles (587 kilometers/365 statute miles), and inclination will be 28.45 degrees to the equator. Discovery will rendezvous with Hubble 320 nautical miles (512 km) above the Earth. Landing is scheduled for Kennedy's Shuttle Landing Facility.

The Crew

Crew Commander Curtis L. Brown Jr. (Lt. Col., U.S. Air Force), who served as Mission Commander on two previous Shuttle missions and as Pilot on three others, will lead the STS-103 mission. His other missions include STS-47, STS-66, STS-77, STS-85 and STS-95 (a 9-day mission during which the crew supported a variety of research payloads including the Hubble Space Telescope Orbital Systems Test Platform). Brown, from Elizabethtown, N.C., received a bachelor of science degree in electrical engineering from the Air Force Academy in 1978. He served as an A-10 and F-16 test pilot before joining NASA and has logged over 6,000 hours flight time in jet aircraft. Brown logged over 1,190 hours in space since being selected by NASA in June 1987, as an astronaut candidate.

Pilot Scott J. Kelly (Lt. Cmdr., U.S. Navy) is a first-time flier aboard the Space Shuttle. Kelly, from Orange, N.J., received a bachelor of science degree in electrical engineering from the State University of New York Maritime College in 1987, and a master of science degree in aviation systems from the University of Tennessee, Knoxville, in 1996. Kelly was first designated as a naval aviator in July of 1989 and then completed training to become a test pilot in June 1994. He has logged over 2,000 flight hours in more than 30 different aircraft. Kelly joined the astronaut program in August 1996.

Payload Commander Steven L. Smith is a veteran of two space flights, STS-68 and STS-82 (the second Hubble servicing mission). Smith performed three spacewalks during STS-82. Smith was born in Phoenix, Ariz., but considers San Jose, Calif., to be his hometown. He received both bachelor and master of science degrees in electrical engineering and a master's degree in business administration, all from Stanford University. He was a payload officer with NASA before being selected as an astronaut candidate in March 1992.

Mission Specialist C. Michael Foale, Ph.D., will be making his fifth space flight after previously accumulating more than 160 days in space, including a four-month stay on the Russian space station, Mir. He was a Mission Specialist on STS-45, STS-56 and STS-63. Foale was born in Louth, England, but considers Cambridge to be his hometown. He attended the University of Cambridge, Queens' College, receiving a bachelor of arts degree in physics, with first-class honors, in 1978. He completed his doctorate in laboratory astrophysics at Cambridge in 1982. Before Foale was selected as an astronaut candidate in June 1987, he was a payload officer in the Mission Control Center at Johnson Space Center.

Mission Specialist John M. Grunsfeld, Ph.D., has flown on two previous Shuttle missions, including STS-67 (the second flight of the Astro observatory, a complement of three telescopes) and STS-81. Born in Chicago, Ill., Grunsfeld received a bachelor of science degree in physics from the Massachusetts Institute of Technology in 1980, and a master of science degree and a doctor of philosophy degree in physics from the University of Chicago in 1984 and 1988, respectively. Grunsfeld started his astronaut training in August 1992, after holding numerous academic positions and performing research in various areas of astrophysics.

Mission Specialist Claude Nicollier, (Capt., Swiss Air Force) will be making his fourth space flight. His previous Shuttle missions include STS-46, STS-61 (the first Hubble Space Telescope servicing mission) and STS-75. Nicollier is a native of Vevey, Switzerland. He received a bachelor of science degree in physics from the University of Lausanne in 1970, and a master of science degree in astrophysics from the University of Geneva in 1975. Nicollier was selected as a European Space Agency astronaut in 1978, and, under an agreement between NASA and the European Space Agency, he joined the NASA astronaut candidates selected in May 1980.

Mission Specialist Jean-Francois Clervoy, a European Space Agency astronaut, has flown on two other Space Shuttle missions, STS-66 and STS-84. Clervoy, from Toulouse, France, received his baccalauréat from Collège Militaire de Saint Cyr l' Ecole in 1976, and graduated from Ecole Polytechnique, Paris, in 1981. He lectured in signal processing and general mechanics at the Ecole Nationale Superieure de l'Aeronautique et de l'Espace in Toulouse. He was selected as a French astronaut in 1985. Clervoy trained in Star City, Moscow, on the Soyuz and Mir systems in 1991, and was selected as an ESA astronaut in 1992.