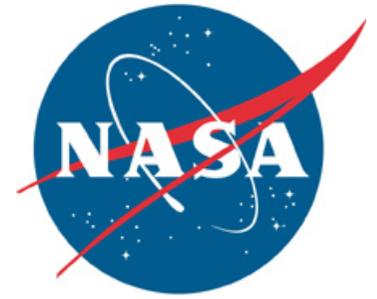


# Spaceport News

John F. Kennedy Space Center - America's gateway to the universe

[www.nasa.gov/centers/kennedy/news/snews/spnews\\_toc.html](http://www.nasa.gov/centers/kennedy/news/snews/spnews_toc.html)



## Inside this issue . . .

**Water recycler  
passes taste test**



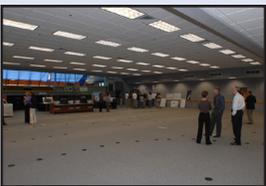
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**Ares I-X update**



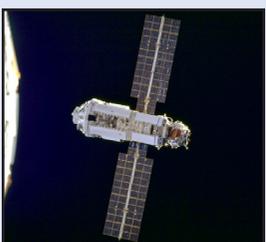
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**Ares I-X  
Firing Room**



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**Heritage:  
Zarya kicks off  
ISS construction**



Page 7

## Endeavour pierces night sky

*Landing scheduled  
for Nov. 30; Other sites  
remain an option*

It's a spectacular event you won't see from anywhere else, but right here at Kennedy Space Center. A bright orange moon served as a backdrop for space shuttle Endeavour as it soared through the night sky and penetrated the sound barrier Nov. 14. But when its time to return to Earth, Kennedy isn't the only option.

So where will Endeavour and its STS-126 crew land Nov. 30? The preferred site is the shuttle's home base at Kennedy -- but there's also Edwards Air Force Base in California and White Sands Space Harbor in New Mexico.

About a week before every launch, more than 40 NASA and contractor employees fly out to the alternate landing sites.

"These folks stay the entire mission," said Michael Kuta, integrated landing operations

See **STS-126**, Page 8

**STS-126  
by the numbers**

**7**

highly skilled  
NASA astronauts

**17,000**

pounds of equipment  
and supplies

**16**

days in orbit

**4**

complex spacewalks

**1**

extreme home  
makeover for the  
International Space Station

More mission photos, pages 4-5

Photo: NASA/Rusty Backer-George Roberts

# Water reclamation system among ISS improvements

By Steven Siceloff  
Spaceport News

Nature's been recycling water on Earth for eons, and now NASA is set to do the same thing above Earth on the International Space Station.

Space shuttle Endeavour is carrying two refrigerator-sized racks packed with a distiller and an assortment of filters designed to process astronauts' urine and sweat into clean drinking water.

The station crew depends now on water carried up aboard a space shuttle or cargo spacecraft. But an operational water recycler is expected to cut that need by 65 percent by producing about 6,000 pounds of potable water each year. That's enough fresh water to allow the station to host six crew members instead of three.

A system that operates on the station also will provide a significant stepping stone to developing even more efficient processes which will support astronauts on the moon or on long-duration voyages into the solar system.

Although Russia's space station Mir recycled cosmonauts' sweat, the NASA recycler is the first to be flown in space that intends to cleanse and reuse almost all the water a crew member produces.

The system can recycle about 93 percent of the water it receives, said Bob Bagdigian, the Regenerative Environmental Control and Life Support System project manager at NASA's Marshall Space Flight Center in Huntsville, Ala.

The water recycler counts in large part on a distiller that Bagdigian compares to a keg tilted on its side. On Earth, distilling is a simple process of simply boiling water and cooling



NASA/Dimitri Gerondidakis

Bob Bagdigian describes the Water Recovery System recently delivered to the International Space Station on space shuttle Endeavour's STS-126 mission. Bagdigian is a project manager with NASA's Regenerative Environmental Control and Life Support System at Marshall Space Flight Center in Huntsville, Ala. Next to Bagdigian is a mock-up of the two racks that will be used. The two units of the Water Recovery System are designed to provide drinking-quality water through the reclamation of wastewater, including urine, sweat and other hygiene wastes.

the steam back into pure water. But without gravity, the contaminants in water never separate from the steam no matter how much heat is used.

"In space, it becomes quite a challenge to distill any liquid in the absence of gravity," Bagdigian said.

So the keg-sized distiller is spun up to produce an artificial gravity field. The contaminants in the liquids press against the sides of the drum while the steam gathers in the middle and is pumped to a filter.

The filters are not much different from those used on Earth, which means they use charcoal-like materials to pull more unwanted elements from the water. Another process uses chemical

compounds that bond with the remaining contaminants so filters can pick them out of the water, too.

"The water that we produce meets or exceeds most municipal water product standards," Bagdigian said.

The system has been in different stages of development ever since NASA committed to building a space station in the 1980s. Along the way, individual parts of the system have been flown on space shuttle missions for tests.

The distiller mechanism flew in 2003 and worked just fine in orbit, Bagdigian said.

Now the crew of the International Space Station will test the whole apparatus, but they won't drink

any at first. Instead, they will take numerous samples and return them to Earth for detailed testing. After the testing is complete, controllers will clear the astronauts to drink the water in orbit.

NASA's water filter development also has helped produce filters that are now used in humanitarian efforts to make clean water in areas served only by contaminated sources.

The effort to make a crew support system that reduces the need for fresh supplies from Earth includes an oxygen generator which already is installed in NASA's Destiny lab on the space station.

Housed in one rack instead of the two required for the water recycler, the oxy-

gen producer splits the oxygen and hydrogen molecules in water and sends the oxygen into the space station as breathable air. The hydrogen is now dumped overboard. However, another process is under development that will combine the hydrogen with other chemicals which react with each other and produce more water.

While the water recycler in use will work fine for the International Space Station's needs, Bagdigian said work already is under way to make it more efficient so it can be used on long moon exploration missions.

"We'll take this system and continue to push its performance and efficiency," Bagdigian said.

# Weight not an issue with Ares I-X upper stage

By **Steven Siceloff**  
*Spaceport News*

Vince Bilardo may be the only rocket designer in history without a weight problem.

Instead of trying to make an upper stage simulator for next year's Ares I-X test flight as light as possible, Bilardo and his team from NASA's Glenn Research Center in Ohio were given no weight restrictions, only guidelines for how it had to look on the outside.

Steel replaced aluminum and other exotic materials as the designers and builders assembled 11 large cylinders. That will change for the operational Ares I rocket when weight control will return as a primary factor for designers.

"This is essentially bridge construction-grade steel," Bilardo said as he



NASA/Jack Pfaller

In the Vehicle Assembly Building high bay 4 at Kennedy Space Center, workers remove the final cover from the U.S. flag decal affixed to one of the Ares I-X upper stage simulator segments. The upper stage simulator will be used in the test flight identified as Ares I-X in 2009.

walked among the cylinders inside the Vehicle Assembly Building at Kennedy Space Center.

Even with nine cylinders of 1/2-inch-thick steel and two more of 3/4-inch-thick steel, Bilardo's team had to build a place for 150,000 pounds in steel plates to accurately simulate the weight of a fueled upper stage.

The segments will be

stacked on top of each other in coming months as the elements of the first Ares I rocket come together at Kennedy. The cylinders, which match the diameter of the Ares I upper stage, will be stacked on top of a solid rocket booster like the ones the space shuttle uses.

Only the first four segments of the first stage will be active for the Ares I-X

test. A fifth segment, the upper stage and an Orion spacecraft at the top will be sensor-laden mass simulators.

Nor will astronauts be inside the spacecraft for the test flight. NASA has not tested a new launch vehicle design for human flight since the space shuttle made its first flight in April 1981.

The Ares I-X mission focuses on the first stage. Engineers have developed complex computer models to predict how the rocket will behave in flight, but managers want actual flight data to back up their projections. The first stage is based on the space shuttle's solid rocket boosters, which have always flown in pairs.

The test flight will measure in detail what a single booster with a large stage standing on top of it will do as it leaves the launch

pad and soars into the upper atmosphere.

"It's one big data probe that we are flying through the most demanding ascent phase," said Jeff Hanley, manager of the Constellation Program. Constellation includes the Ares I and V rockets, the Orion spacecraft and the Altair moon lander.

The upper stage simulator will not fly for long. After the first stage burns out about two minutes after liftoff, it will separate and the upper stage will soar along unpowered until it splashes down in the South Atlantic Ocean.

While the rocket comes together at Kennedy for the test flight, other aspects of the Constellation Program are progressing as well. Designs are moving through review stages steadily, including the new engine being developed to power the Ares I upper stage.

## Opportunity highlights Workforce Leadership Summit

By **Linda Herridge**  
*Spaceport News*

Local, state and federal agency representatives participated in a Workforce Leadership Summit on Nov. 14 at Space Florida's conference facility in Cape Canaveral.

The summit, organized by Space Florida and the NASA's Office of Legislative and Intergovernmental Affairs, helped to energize other agencies' interest and involvement in Kennedy Space Center's work force transition.

They shared information with local participants on ways each agency could be tapped for resources and assistance.

The scheduled retirement of NASA's space shuttle fleet in 2010 will make way for the next generation of space vehicles. Aerospace and business leaders heard updates on the agency's work force transition efforts from NASA Administrator

Michael Griffin and Kennedy Center Director Bob Cabana.

"The best and brightest workers are at Kennedy. It's important we do everything we can to help transition folks who have been so good to us," Griffin said. "We need to sketch out a bright future for NASA and regain the capacity to get out of low-Earth orbit.

"We have problems in front of us, but they are the kind that lead to change and we hope in a good way," Griffin said.

Cabana said Kennedy's core capability is launching rockets and humans to space safely and expertly. He hopes for technical jobs that will contribute to the NASA mission and provide growth.

"We have an obligation to take care of the work force. I'm dedicated to this team. We have a tremendous future in front of us," Cabana said.

Space Florida President Steve Kohler said one of the keys to a suc-

cessful transition is engaging other agencies at the federal level.

"It's relevant to tap into the federal connection and the agencies that are involved," Kohler said. He noted that of Florida's 67 counties, more than 40 have companies which support the space program.

A panel of state and local representatives included, Chris Hart, president of Workforce Florida Inc.; Kennedy Deputy Center Director Janet Petro; Lisa Rice, Brevard Workforce Development Board, or BWDB, president; Rob Salonen, director of business recruitment with the Economic Development Commission of Florida's Space Coast; and Kohler.

Rice said BWDB formed an Aerospace Career Disbursement Panel in 2007 to focus on the aerospace industry and transition of the Kennedy work force. The board signed a Space Act Agreement with Kennedy earlier this year. Recently,

the organization provided certification for Kennedy firefighters to satisfy a new requirement.

Rice said the BWDB is focused on finding new work packages for contractor workers at the center.

"Our goal is to keep as many workers here in Brevard," Rice said.

Hon. Michael Hager, acting director of the Office of Personnel Management, or OPM, in Washington, D.C., said OPM needs to reinvest in the agency's human capital.

"NASA has continued to make mission impossible possible, time and time again," Hager said. "Space employees have made it possible for us to celebrate a rich history. We're looking for ways to partner with NASA to reinvest in skills."

### More online

For more, go to [www.usajobs.gov](http://www.usajobs.gov) or [www.gsa.gov/jobs](http://www.gsa.gov/jobs)

# Scene Around Kennedy Space Center



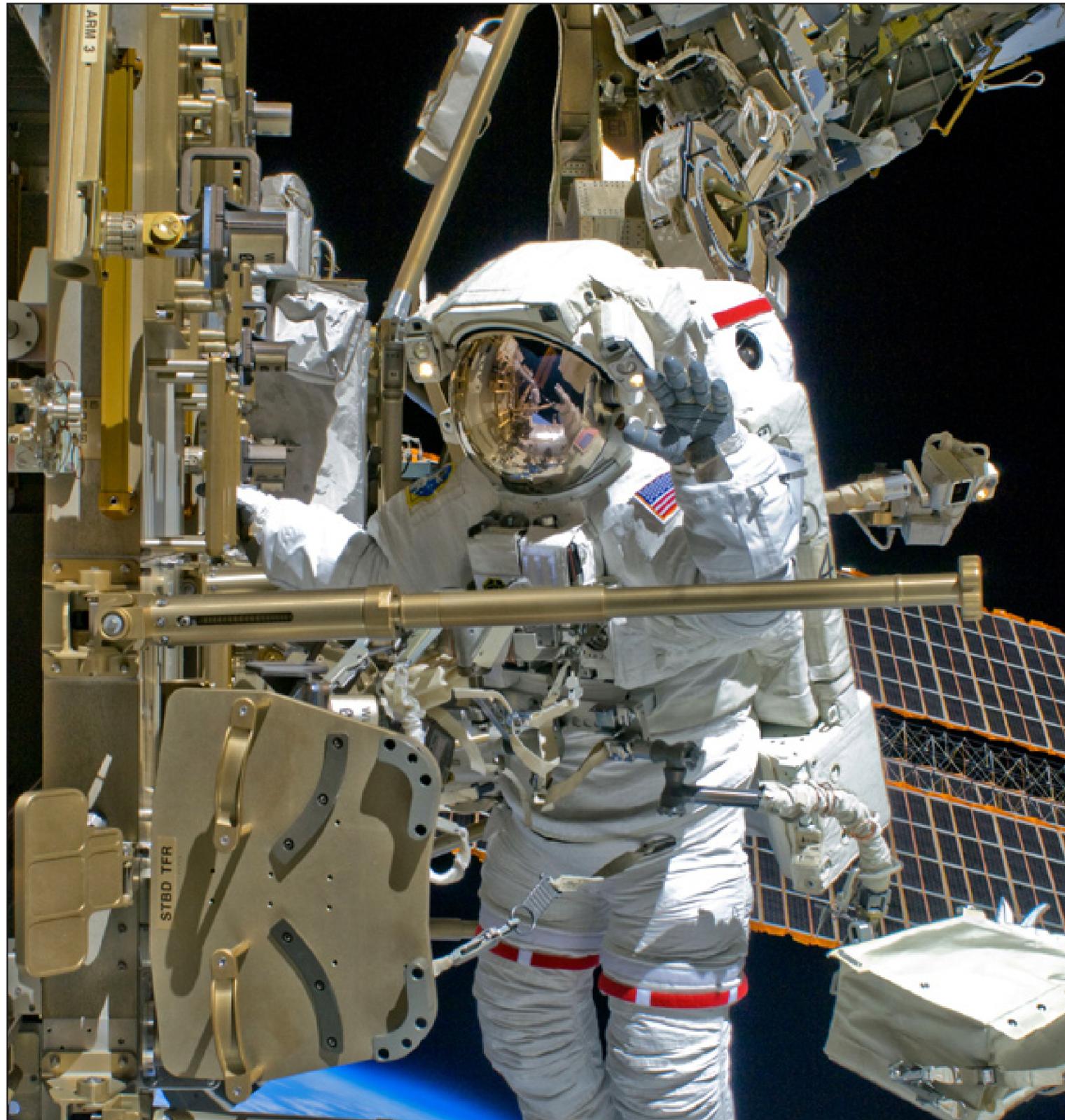
NASA/Kim Shifflett

After the successful launch of space shuttle Endeavour on the STS-126 mission, Kennedy Center Director Bob Cabana and STS-126 NASA Test Director Charlie Blackwell-Thompson show off their newly clipped ties, which signifies their initiation experience of their first shuttle launch.



For NASA

Computers, printers, fax machines, cell phones and other electronic equipment were collected during the America Recycles Day on Nov. 15. Kennedy Space Center sponsored the one-day event in the Vehicle Assembly Parking lot across from the Multi-Function Facility where personal E-waste was collected.



NASA

Astronaut Shane Kimbrough, STS-126 mission specialist, participates in the mission's second scheduled spacewalk during construction and maintenance on the International Space Station. During the six-hour, 45-minute spacewalk, Kimbrough and Mission Specialist Heidemarie Stefanyshyn-Piper (not seen), continued the

process of removing debris and applying lubrication around the starboard Solar Alpha Rotary Joint, replaced four more of the SARJ's 12 trundle bearing assemblies, relocated two equipment carts and applied lubrication to the station's robotic Canadarm2.



NASA/Amanda Diller

The Railroad Operation and Maintenance Team completed the refurbishment of NASA Railroad locomotive 3 recently. The 15-month process, including a new paint scheme, dealt with extensive corrosion to the locomotive because of Kennedy Space Center's proximity to the Atlantic Ocean. Locomotives 1 and 2 also will eventually be refurbished. The NASA Railroad locomotives are SW-1500 switch engines built by Electro Motive Diesel.



For NASA

Members of the Launch Services Program (including the Safety and Mixed Martial Arts Launch Service Division), gathered for food, fun and games to celebrate the 10th anniversary of the program Nov. 7 at KARS I Park.

## Spaceport News wants your photos

Send photos of yourself and/or your co-workers in action for possible publication. Photos should include a short caption describing what's going on, with names and job titles, from left to right. Send your photos to:

**KSC-Spaceport-News@mail.nasa.gov**

# Ares I-X test flight firing room offers lots of elbow room

By Steven Siceloff  
Spaceport News

NASA Test Director Jeff Spaulding stood in a half-empty room in the Launch Control Center with a small group of NASA officials and a large gaggle of reporters around him. Television cameras rolled and still cameras clicked along while Spaulding talked about the upcoming launch of the Ares I-X test flight.

That's when you realize this is not a typical firing room.

For one thing, there's not enough room between the computer consoles and equipment to hold a group together in any of the three firing rooms set up for space

shuttle launches.

As modern as the Ares I-X firing room is, its main feature is its emptiness. About half the firing room has nothing in it other than close-cropped gray carpeting. There's a single horseshoe-shaped console in the middle, facing the vast glass wall that looks out on the launch pads. There also are a few rows of consoles on risers looking toward the horseshoe.

The test flight will pave the way for an operational Ares I rocket and Orion spacecraft as part of NASA's Constellation Program. The Ares I will lift astronauts to the International Space Station. Later, the rocket will carry Orion to a rendezvous

with an Altair lunar lander launched separately aboard an uncrewed Ares V rocket that is in design.

Carol Scott, deputy mission manager for the Ares I-X, said the much simpler design of the new rocket requires much less equipment and fewer controllers to manage.

"Ares I-X is a very simple rocket," Scott said. "Much simpler than shuttle, and also the Ares I that is coming along long-term."

Because the Ares I-X is a test of the first stage, much of the stack is not active. The upper stage and Orion spacecraft that top the rocket are simulators for shape and weight. That means controllers special-

izing in everything from the upper stage engine and fuel to environmental systems required in a crewed spacecraft are not needed for the test flight, although they will be utilized for operational missions.

It will take 26 controllers for the Ares I-X flight, Spaulding said.

That number will grow to about 100 for an operational Ares I mission.

"In comparison, I have 200 people over in the shuttle firing room," Spaulding said.

Workers gutted Firing Room 1 in the Launch Control Center and rebuilt it for the Ares I-X flight. It also will serve as the firing room for future Ares I flight

tests and operational Ares I and Orion launches of the Constellation Program.

Pepper Phillips, director of the Constellation Ground Operations Project, said the launch control team focused on designing a system that used fewer controllers.

"As we have gone through this process, we have leaned out the expectations for the support that is required," Phillips said.

Since the Constellation Program is a brand-new effort for NASA, Pete Nickolenko, the senior NASA Test Director, said the launch team had a chance to integrate the latest technologies and procedures into the control room and its infrastructure. That includes ways to take advantage of the individual controllers' skills, too.

"One of the charter points was to keep it lean, certainly put safety first and to consider more or less a badgeless environment so we have the best person in the prime room," Nickolenko said.

For the Constellation Program launches, controllers also are designing a process that requires all information to be electronic instead of using paper. Spaulding said the countdown will be a paperless system.

"I have 6,000 pages of procedures that I use for the shuttle launch countdown," Spaulding said. "Here, I do not have that kind of complexity. And I'll have the ability to have everything online. People can use wireless systems for processing at the various facilities and we'll all be looking at the same things."

Taken together, the changes continue to bring the Ares program into focus for the launch team.



NASA/Jim Grossman

The Ares I-X firing room is large and somewhat empty compared to its predecessors. About half the firing room has nothing in it besides a single horseshoe-shaped console in the middle, which faces the glass wall that looks out on the launch pads. There also are a few rows of consoles on risers looking toward the horseshoe.

# Zarya launch kicked off construction of ISS

By Kay Grinter  
Reference Librarian

The International Space Station got a truly international start with the launch of its first module from Kazakhstan 10 years ago. The Functional Cargo Block, or FGB, lifted off from the Baikonur Cosmodrome aboard a Russian Proton rocket Nov. 20, 1998. During the height of the Cold War, Sputnik I and Yuri Gagarin, the first human to orbit Earth, also had launched from this same Russian launch complex.

The U.S.-funded FGB -- given the name Zarya or "sunrise" in English -- is a U.S. component of the station, built in Russia for NASA by the Khrunichev State Research and Production Space Center under a subcontract to The Boeing Company. The bus-sized Zarya is 41.2 feet long and 13.5 feet wide at its widest point.

Sixteen days later, during space shuttle Endeavour's STS-88 mission, the U.S.-built connecting Unity module, or Node 1, was attached to Zarya.

Designed to multitask, Zarya provided orientation control, communications and electrical power for the passive Unity module. Zarya's two large engines would be used to re-boost the conjoined spacecraft and make any major orbital changes required over the months to come.

Kennedy Space Center Director Bob Cabana, a former astronaut, was commander of that shuttle mission. In a recent update with agency employees, Cabana gave his impressions of our Russian partner and his optimism about our continued cooperation before the Ares I program begins operation.

"On a working level,



A three-stage Russian Proton rocket launched the Zarya Control Module in November 1998. The module is now used primarily for its storage capacity and external fuel tanks.

NASA file

## Remembering Our Heritage

when you get down and work with their engineers, you know, we speak engineering. It's an excellent relationship," Cabana said. "I think the friendships we have made with the folks in their control room, the mutual respect, hopefully, that will win out."

NASA Administrator Mike Griffin, also addressing the work force, recalled that the Russians "were a little late delivering the first pieces of space station." He was referring to launch of the station's third component, a Russian-provided crew living quarters, known as the Zvezda Service Module, intended to enhanced or replace many of the functions Zarya was performing. Instead of flying



NASA file

The U.S.-funded and Russian-built Zarya, which means "sunrise" in English, was designed to provide the International Space Station's initial propulsion and power.

autonomously for six to eight months as planned, Zarya was not relieved of duty for almost two years.

However, the Russians have "always done what they said they would do when the negotiating was done, so I believe that, evidence to the contrary, they will continue to do so," Griffin said. "I believe it's better for the U.S. and for the world for us to be partners on station than not."

Bill Ingalls, NASA Headquarters senior contract photographer, was in Baikonur for the launch of Zarya and has made numerous trips to Moscow to cover meetings between NASA and the Russians.

"I was treated with respect and observed the mutual respect between the representatives of the space agencies," Ingalls said. "What a thrill it is to be working on a project like the station that does not involve

aiming missiles at each other."

Designed with an operational lifetime of no less than 15 years, Zarya is now used primarily for its storage capacity and 16 external fuel tanks that can hold more than six tons of propellant combined. Its side docking ports accommodate Russian Soyuz piloted spacecraft and unpiloted Progress re-supply ships.

Since Zarya's launch, there have been 29 additional construction flights to the station: 27 aboard the space shuttle and two additional Russian launches. The station's mass has expanded to more than 627,000 pounds, and its interior volume is comparable to the size of a five-bedroom house.

In the 10 years since this incredible international endeavor began, 167 individuals representing 14 countries have visited the orbiting complex.

From STS-126, Page 1

manager for United Space Alliance. "After launch and prior to landing is when we activate EOM, or end of mission, where we send another eight folks to White Sands and another 75 to Edwards."

Weather plays a key role on where the space shuttle touches down. Because rain can damage the shuttle's sensitive heat shield, and more importantly cause the giant glider to lose speed and potentially not reach its intended landing spot, there can't be any rain showers within 30 miles of the landing site. Also, visibility has to be top-notch for the pilot to glide the shuttle safely to Earth -- and with Florida's finicky weather, clear skies aren't guaranteed.

"Edwards is much like it is here, with the same capabilities as far as runway and convoy operations," Kuta said. "The only difference is we tow the orbiter to the Mate-Demate Device at Dryden, instead of the orbiter processing facility at Kennedy."

Astronauts and their vehicles are no strangers to the California landing site. In fact, there have been 51 landings at Edwards since NASA began flying space shuttles in 1981 and crews practice landing there before every mission -- although this time

around, it's a little different. "If we land there, it will be a temporary runway that was constructed last year," Kuta said. "The main runway is being refurbished and will be complete before the STS-119 launch," targeted for Feb. 12, 2009.

Columbia on mission STS-3 was the first and only to make use of the White Sands landing facility in March 1982. The winds were so high, dust and sand added weeks of cleaning time to processing.

"The turnaround area relocated, so wind isn't so much of a factor now," Kuta said. "It can still take about 28 to 30 days to prepare a shuttle for its return to Kennedy because of limited capabilities."

So what happens if Endeavour and its crew land at either alternate location? Kuta says about 40 members of the de-orbit burn team will fly out of Orlando International Airport the day of landing and a team of about 180 Kennedy employees will charter an aircraft the next day to support turnaround operations. Once the shuttle is ready, a Boeing 747, known as the Shuttle Carrier Aircraft, will ferry it back to Kennedy.

As of print time, the weather at Kennedy looked "green" for a Nov. 30 landing at approximately 1:18 p.m. EST.

# WORD ON THE STREET

*Would you be willing to drink from the wastewater recycling system Endeavour brought up to the International Space Station on the STS-126 mission?*



*"Yes. Our engineers are very capable of making the equipment. We have the best of the best."*  
**Mike Felker, with NASA**

*"Yes. The system essentially does exactly what the Earth does in a matter of minutes."*

**Victor Alvarez, with NASA**



*"Maybe. Because if I knew the people I was with at the time it might be a little easier."*  
**Amber Charvet, with NASA Exchange**



*"Absolutely. I have faith in my NASA comrades."*  
**Tom Cook, with NASA**



*"Maybe. If they could somehow prove to me that there was absolutely no bacteria in it."*  
**Connie Wright, with NASA Exchange**

## Conflict Resolution Program can help

Conflict resolution assists Kennedy Space Center in managing institutional risk to mission success. From time to time, managers, supervisors and employees need help with solutions and communication.

If you have a workplace situation that may benefit from coaching and/or mediation contact Rob Grant, the Conflict Resolution Program Manager at [Milton.R.Grant@nasa.gov](mailto:Milton.R.Grant@nasa.gov) or 321-867-9169 for assistance with resolving workplace issues.

## Looking up and ahead

No earlier than Dec. 16	Launch/CCAFS: Delta IV, NR0L-26; TBD
Feb. 4, 2009	Launch/VAFB: Delta II, NOAA-N Prime; 5:22 a.m. EST
Target Feb. 12, 2009	Launch/KSC: Discovery, STS-119; 7:36 a.m.
No earlier than April 6, 2009	Launch/CCAFS: Delta IV, GOES-O; TBD
Scheduled for March 5, 2009	Launch/CCAFS: Delta II, Kepler; 10:48 p.m. EST
No earlier than April 1, 2009	Launch/CCAFS: Delta II, STSS; TBD
April 24, 2009	Launch/CCAFS: Atlas V, LRO/LCROSS; TBD
Target May 15, 2009	Launch/KSC: Endeavour, STS-127; 4:52 p.m.
Target July 12, 2009	Launch/KSC: Ares I-X test flight/Launch Pad 39B; TBD
Target July 30, 2009	Launch/KSC: Atlantis, STS-128; TBD
Target Oct. 15, 2009	Launch/KSC: Discovery, STS-129; TBD



John F. Kennedy Space Center

# Spaceport News

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