STS-114 crewmembers touring upgraded facilities and navigation aides at White Sands Space Harbor (Facility and NAVAID upgrades were deemed to be RTF).

NASA/Rosales WSTF0804e7240

White Sands Test Facility

Testing for Return to Flight

by Cheerie R. Patneaude
NASA White Sands Test Facility

Employees at the White Sands Test Facility (WSTF), located near Las Cruces, N.M., have been gearing up toward returning the Space Shuttle to flight. WSTF performs a wide range of activities in support of the Space Shuttle Program, including refurbishing flight hardware, maintaining and operating Fleet Leader test articles, performing hypervelocity impact testing, conducting materials and component tests and supporting the astronaut approach and landing training missions.

"This has been a very busy time for us. As we approach the Return to Flight launch, other issues or concerns are likely to arise. However, I am confident that the employees of WSTF can and will step up to the challenge in conducting the testing and component repairs necessary to ensure a safe and successful mission," Robert Cort, chief of the Propulsion Office, said.

The WSTF flight hardware depot has been extremely busy performing preventative maintenance, repairs and overhaul of components from the Orbital Maneuvering Subsystem and Reaction Control Subsystems (RCS). These rocket propulsion subsystems provide thrust to the orbiter for in-orbit operations ranging from orbit circularization, rendezvous and docking to deorbit. Most of the activity has been geared towards the RCS thrusters. Each Space Shuttle orbiter has 38 of these relatively small rockets, and WSTF has completed maintenance and repair on every one of them scheduled to fly on the Return to Flight mission.

In addition, WSTF has conducted extensive evaluation and testing associated with the design of a flexible hose installed in the forward RCS propellant system. Since WSTF maintains the Fleet Lead test articles and preserves the history of the components installed, the facility is working to resolve a concern about the life expectancy of the flex hoses.

On the aft RCS test article, WSTF recently evaluated the effect of closing a valve in the propellant supply system to the rocket engine. This action would effectively starve the thruster of propellant, similar to running out of gas, in the event the engine failed to turn off when commanded. This test will help figure out a way to reduce the risk of a Shuttle mishap when docking with the International Space Station.

WSTF employees continue to focus on the ongoing objectives of various projects. The depot continues to perform evaluation, repair and overhaul of flight hardware to ensure that sufficient spare components are available. The Fleet Lead Program maintains active test articles to evaluate components for life-dependent failures and provide a test bed for anomalies or process changes at the Kennedy Space Center. Tests are being conducted on the Space Shuttle Auxiliary Power Unit to extend its qualified life.

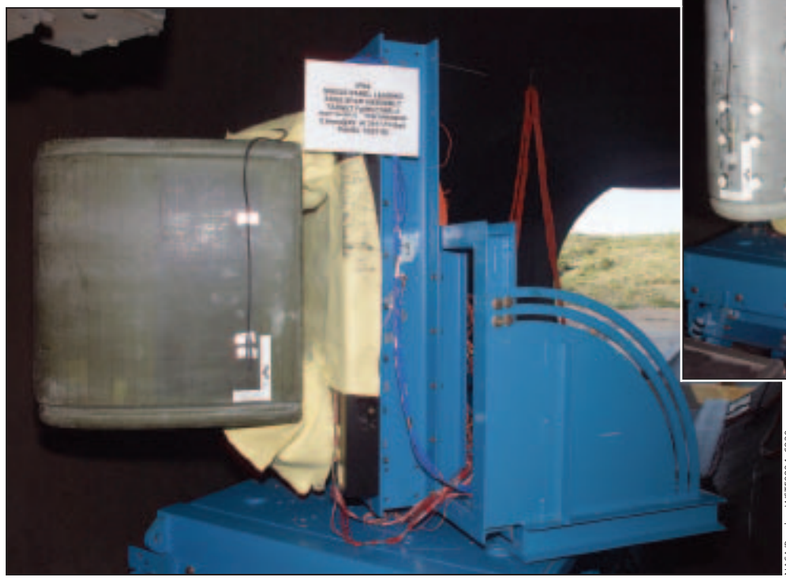
Additionally, employees have been testing low- and high-velocity impacts against the Shuttle wing's leading edge. The Hypervelocity Group has completed three separate test programs related to the Return to Flight effort. One program was the Impact Penetration Sensor System test, which lasted throughout 2004. More than 211 total tests were performed on the thermal protection tile panels, the fiberglass leading edge of the wing and the Reinforced Carbon-Carbon (RCC) panel. Over 100 sensors were applied to each test article to evaluate the magnitude and arrival time of the impact-generated stress waves. Two data acquisition systems with support personnel from Johnson Space Center, Langley Research Center and Boeing supported the effort full-time.

"Our team is continually researching to find answers to the potential questions Houston may have about strikes from orbital debris," said Don Henderson, project leader for the Hypervelocity Impact Team.

Another Return to Flight evaluation was the RCC Damage Assessment Program. Flown RCC test coupons from the RCC panel of *Atlantis* were impacted with projectiles of various sizes. The RCC specimens were then sent to an arc-jet facility to determine the effect of hypervelocity impacts.

WSTF is proud to contribute its expertise to making Return to Flight as safe as possible. The testing being done at WSTF will provide astronauts an improved stepping-stone to the cosmos.

"It is an honor to work here at WSTF and work to keep the Space Shuttle and its astronauts safe," said David Hirsch, supervisor of the hypervelocity impact team.



NASA/Rosales WSTF0804e6920

NASA/Rosales WSTF0804e7777

Hypervelocity Impact Testing of RCC Wing Leading Edge.

NASA/Blair ISS011-S-002

Expedition 11 crew, from left, Commander Sergei Krikalev and NASA ISS Science Officer and Flight Engineer John Phillips.

Space Station tops the list as a popular summer stop

by Joanne Hale

Expedition 11

Commander Sergei Krikalev, 46, and NASA ISS Science Officer and Flight Engineer John Phillips, 54, will be busy this summer taking care of business onboard the International Space Station as well as welcoming a variety of guests.

Highlights of the new Expedition 11 crew's mission include welcoming the crew of the Space Shuttle *Discovery* on its STS-114 mission, the first Shuttle flight since the *Columbia* accident.

The crew also may see the addition of a third crewmember who will be brought to the Station by *Atlantis* on the STS-121 mission. Plans call for them to do one spacewalk, in Russian spacesuits from the Pirs Airlock. The spacewalkers will continue outfitting the Station's exterior and work with scientific experiments.

The Expedition 11 crew will also welcome the arrival of two Progress unpiloted supply vehicles. Progress 18 is scheduled to reach the Station in June and Progress 19 should be launched near the end of August.

In August, Krikalev and Phillips will move their Soyuz spacecraft from the Pirs docking compartment to the Zarya docking port. That will permit use of the Pirs Airlock for the spacewalks.

Krikalev is a veteran of five previous spaceflights, including two missions to the Russian space station Mir and two Shuttle flights. He was a member of the first Station crew, serving aboard a much smaller Space Station from Nov. 2, 2000, to March 18, 2001. He has spent a year, five months and 10 days in space. This flight should see him become the world's most experienced space traveler.

Born in Leningrad (now St. Petersburg), Russia, he graduated from what is now St. Petersburg Technical University in 1981 and then joined NPO Energia, the Russian organization responsible for human spaceflight. He was selected as a cosmonaut in 1985.

Phillips was born in Fort Belvoir, Va., and considers Scottsdale, Ariz., his home. He graduated from the Naval Academy in 1972 and became a Naval aviator. After leaving the Navy in 1982, he earned a master's and doctorate in geophysics and space physics from the University of California in 1984 and 1987. He did postdoctoral work at the Los Alamos Scientific Laboratory in New Mexico.

He was selected as an astronaut in 1996. He was a member of the STS-100 crew of *Endeavour* in 2001. On that mission he coordinated two spacewalks at the Station to install Canadarm2.

Phillips has wanted to return to the Station ever since. "It was a wonderful place to be," he said. "The crew was doing a great job; they were having a good time." He wanted to stay longer then. Now he'll have about six months there.

NASA/Ingalls JSC2005E15429

The Soyuz TMA-6 vehicle rolled to its launch pad at the Baikonur Cosmodrome in Kazakhstan on April 13, 2005, in preparation for its launch April 15 (Kazakhstan time) to send Cosmonaut Sergei K. Krikalev, Russia's Federal Space Agency Expedition 11 commander; Astronaut John L. Phillips, NASA ISS science officer and flight engineer; and European Space Agency Astronaut Roberto Vittori of Italy to the International Space Station. Krikalev and Phillips will spend six months in space and greet the first Shuttle crew to fly in more than two years when it arrives at the Station, while Vittori spends eight days on the Station under a commercial contract between ESA and the Russian Federal Space Agency.

Krikalev and Phillips are the Station's fifth two-person crew. After the *Columbia* accident on Feb. 1, 2003, the ISS Program and the international partners determined that because of limitations on supplies the Station would be occupied by two crewmembers instead of three until Shuttle flights resume.

The 11th crew will continue science activities, initially with facilities and samples already on the Station but later with experiments scheduled to arrive at the Station aboard *Discovery*.

Krikalev and Phillips are scheduled to spend about 180 days on the Station, returning to Earth in October, a little over a week after the arrival of their Expedition 12 successors.