NEWS FROM WHITE SANDS

Prestigious NASA Team Award given to Hypervelocity Team

By David Hirsch

Teamwork has paid off for the NASA Hypervelocity Impact (HVI) Testing operations team. They have successfully consolidated testing operations at White Sands Test Facility (WSTF), a feat that would not have been possible without cooperation between the joint WSTF contractor, WSTF and JSC.

The HVI team is satisfying customers and meeting or exceeding their expectations. Currently, all four test ranges are operational and the average report turnaround time of one day is unprecedented. Customers are getting the results of their hypervelocity impact tests faster than ever.

There are a few programs the team has completed that they are especially proud of.

The HVI team designed and built a high-voltage, high-current test system capable of energizing one of the ISS primary power cables. The system needed to be capable of collecting high and low speed current and voltage data, as well as high-speed cinema and real-time video.

The test series required urgent systems modifications, same-day coordination of requirements with customers, completion of testing and reporting of results. The test series has enabled ISS designers to evaluate primary power loss risk.

The HVI team was also asked to evaluate toughened Shuttle Thermal Protection system tiles for HVI resistance. The purpose of the tests was to evaluate penetration effects of these new tiles when compared with current tiles. A total of 26 shots were fired and the results accurately reported on time even with tests occurring during the holidays.

Whether or not space structures could become a reality became a question the HVI team had a hand in answering when they developed and tested shielding concepts for the Transhab module. A one-fifth scale and full scale test of variations of the inflatable habitat's shielding has helped JSC get one step closer to making inflatable space structures a reality.

The WSTF Team members who contributed to the successes of Hypervelocity operations are: Tony Carden, Ed Denzler, Grant Dyer, Lenny Farnell, Don Henderson, Dave Hicks, Dave Huskey, Mike Kirsch, Paul Mirabal, Randy Page, Gary Peyton, Lou Rosales, Paul Schauer, Paul Spencer, Larry Starritt, Adrianne Telles, Anthony Trejo, Brooks Woole and Carl Wright.

The JSC Team members are: Freeman Bertrand, Eric Christiansen, Jim Hyde, Justin Kerr, Jay Laughman, Dana Lear, Frankel Lyons and Tom Prior.

WSTF develops toxic chemical detector

By Eric Raub

Potential hazards have always awaited astronauts brave enough to venture out of their spacecraft. Yet even when they come back through an airlock safe and sound, they may be bringing back with them some of the hazards of space in the form of toxic chemicals.

Astronauts who work outside of the Space Shuttle or the International Space Station (ISS) run the risk of coming into contact with monomethylhydrazine (MMH) and unsymmetrical dimethylhydrazine (UDMH).

Both of these chemicals are potential cancer-causing agents. Among other unpleasant side effects, the chemicals can cause nausea, vomiting and convulsions, and can potentially cause permanent damage by reducing the flow of oxygen to the brain.

These dangerous chemicals aren't coming from a galaxy far away, but from maneuvering and position-stabilizing thrusters on the Space Shuttle and ISS. If these toxic propellants would contaminate the Extravehicular Mobility Units, they may piggyback into the vehicle's airlock and would then contaminate the Shuttle Orbiter or ISS atmosphere if they remained undetected.

Even a small amount of these chemicals floating around in the airlock atmosphere is bad news for the astronauts, but how do the astronauts find out if they are present before the adverse reactions start?

The answer came from the White Sands Test Facility, which designed, developed, tested and flight-certified an effective MMH and UDMH detector using a pale yellow gold salt. All of the existing detectors had problems that kept them from being effectively used on the shuttle and ISS. So, Louis Dee, Ben Greene and Steve Hornung set out to build a better mousetrap.

"These commercial electrochemical reactors require an electrolyte. Water is primarily used," Dee said. "They would need to be placed in the vacuum of space; therefore, water is undesirable. ... They also respond to such interfering substances as hydrogen, ammonia and isopropyl alcohol."

Their gold salt detector effectively operates in the presence of the vacuum of space and can detect small concentrations of dangerous chemicals even with interfering substances in the sample. When the chemicals come into contact with the gold salt, a colorful reaction happens that tells the astronauts now whether or not they have a potential hazard on their hands.

"Hydrazines are very powerful reducing agents. Gold salt is an oxidizer," Dee said. "When the two come in contact with each other they spontaneously react. The pale yellow gold salt turns to a lavender or purple elemental gold."

Their detector first flew on STS-98 and is now standard equipment for the shuttle. However, a problem arose in using it in the new ISS airlock. The detector needs access to the vacuum of space to draw a sample of the atmosphere across the gold salt, but no ready access exists in the airlock.

"The airlock does not have the necessary connection to the vacuum of space needed for sampling," Dee said. "It does have a Manual Pressure Equalization Valve (MPEV) installed on the airlock hatch."

WSTF engineers Brian Anderson and John Anderson quickly solved the problem by designing an adapter that connects the detector to the vent valve. The WSTF Machine Shop fabricated the prototype over a weekend. The two hand delivered it to KSC that Tuesday and checked the fit of the prototype to the airlock MPEV outfitted in protective "bunny" suits.

Design of the Flight ISS Contamination Sampler proceeded in the following months. Russell Gardner and Norman Paquette of the WSTF Machine Shop worked overtime and on weekends to fabricate the parts, and Jessie Witcher joined them to inspect the parts.

The adapter proved to be just the piece of equipment needed to use the detector in the ISS airlock. It was launched on STS-104. Now, whether in the Space Shuttle or the ISS, the astronauts can breathe, eat and sleep a little easier knowing that the hazards of outer space are right where they should be. ■

Pictured here is the White Sands Test Facility team that developed a toxic chemical detector. Pictured, left to right, are Randy Page, Lou Rosales, Norm Paquette, Dave Huskey, Steve Hornung, Dave Baker, Jesse Witcher, John Anderson, Bob Duke, Russell Gardner, Lou Dee, Jayme Bass.