Space Systems Company – Michoud Operations

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Mission Success Bulletin

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STS-115

Mission managers confident *Atlantis* in good shape

Following five launch scrubs due to lightning strike, hurricane threat, fuel cell and sensor problems, *Atlantis* finally returned to space on September 9 after almost four years on the ground.

The wait may have been long, but it seems well worthwhile, as results to date indicate a clean ascent and well-run mission with few issues.

Based on launch day imagery, a handful of minor foam debris releases from ET-118 came off well after the time when the risk to vehicle and crew is greatest.

"To put it in context, we're worried about foam in particular, but also other debris like ice before two minutes and 15 seconds," said **Wayne Hale**, NASA shuttle manager five hours after launch. "After 2:15, there just isn't enough air to transport anything with enough velocity to lead to enough energy for debris to do any damage."

According to Hale, ET-118 performed well.

"We'll still do the inspection, but this tells us that we have a really good tank – it also tells us about the time of release and the size of the release, and both of these things are telling us that we're reducing the risk and flying a safer and safer profile."

Wanda Sigur, ET program manager concurs. "Preliminary assessments of flight imagery and performance data show that all of ET-118's systems – structural, propulsion, electrical, as well as thermal protection – performed nominally," said Sigur. "Our early analyses are showing that foam loss events, both in size and time of release, are as predicted. The mission performance cannot be fully assessed until the Orbiter lands, but early indications are promising."

STS-115 is the first station assembly mission in nearly four years. *Atlantis*' six crew members and the three-member crew of the International Space Station (ISS) are orchestrating a complex work schedule, including three spacewalks to mount a 17.5 ton girder-like truss to station. Attached to the truss are solar arrays built by Lockheed Martin Space Systems in Sunnyvale that will double the station's power generated from sunlight.

With the panels come a Solar Alpha Rotary Joint (also built by Lockheed Martin), a 10-foot wide, wagon wheel-shaped joint that allows the arrays to turn toward the sun. Nothing like this joint has ever flown in space.

When installation of the truss and solar arrays are completed, not only will the ISS be the brightest star in the night sky, but will also be visible during the day.

For ISS viewing opportunities, go to: http://spaceflight.nasa.gov/realdata/sightings/cities/view.cgi?country=United_States&region=Louisiana&city=New_Orleans ■

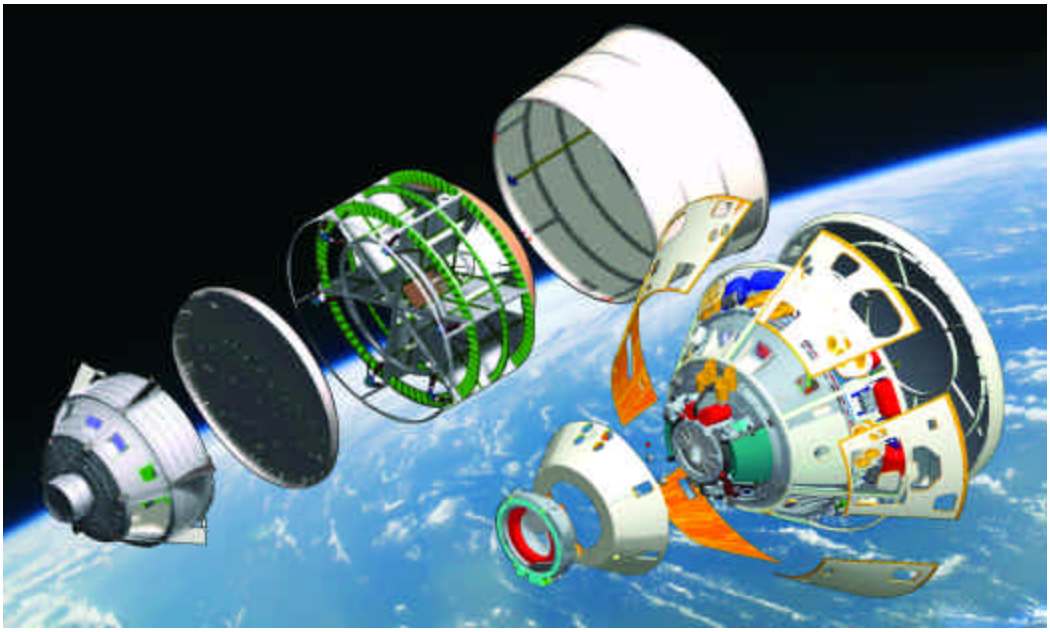
STS-115 successfully launches September 9.

Employees savor CEV win; work to begin immediately

After almost 18 months of work and preparation, the mood in the conference room on August 31 was one of uncertainty. NASA was ready to name the company that would build the Crew Exploration Vehicle (CEV) or *Orion.* Would it be the Northrop Grumman-Boeing team or Lockheed Martin?

Then the official word came down. **Doug Cooke**, NASA's CEV deputy and selecting official, announced, "Lockheed Martin," and the crowd erupted. Joyous emotion reverberated through Michoud buildings.

Randy Tassin remembers high-fives and everyone jumping for joy. "People were just on pins and needles because of all the hard work they had put in on the CEV program for the last year and a half. And with the importance of it to Michoud's future – since the shuttle is flying out in 2010 – it was quite a euphoric moment."



Conceptual art shows what Lockheed Martin's Crew Exploration Vehicle will look like.

The vice president of Program Management & Technical Operations is one of the few remaining employees at Michoud who began their careers in the 1960s. He recalls working on the Saturn V booster program that landed men on the moon, then the External Tank project for 33 years and now… another step in human space exploration.

"CEV is the next program, a continuation of our heritage," Tassin said. "Space exploration is our culture, our legacy."

Michoud CEV Program Manager **Jim Bray** says initial plans include 100 people working on CEV by December, reaching 200 by January.

"We will be awarded Phase A initially. Phase A is seven years, and employment will peak at 360 jobs but average about 200 over the seven years," Bray said. "We bid on Phases A, B & C, which provide options for the production program through 2019."

Lockheed Martin received Authority to Proceed on September 8. Bray says the next step is to meet with NASA to form a single government-contractor team to marry program plans and technical baselines.

He describes the time period from November to February as a season of System Requirements Reviews. "We will go over all the Constellation Program requirements and try to nail down with NASA the size of CEV, the weight allocation, what functions CEV will perform."

Michoud will design, build and test *Orion's* structure, comprised of a crew module on top, the service module in the middle and spacecraft adapter on the bottom. Part of the credit for the CEV win goes to friction stir welding and composites development work that has taken place at the National Center for Advanced Manufacturing (NCAM).

NCAM experience helped Lockheed Martin win CEV.

The crew module or the capsule on top will be baselined to be made of friction stir welded Al-2195 aluminum lithium alloy. The material and weld process has been recognized as a discriminator in the CEV win. Inside the crew module, there will be extensive use of lightweight composite materials.

The service module also will be built using both composites and metals. The spacecraft adapter is designed of composite panels that Michoud employees will fiber place on NCAM equipment.

Michoud will also design the capsule's heat shield for re-entry and apply superlight ablator to the backshell panels to provide thermal protection for ascent and re-entry heating.

In addition, Michoud will be responsible for managing final assembly of the CEV at Kennedy Space Center. Michoud CEV Deputy Program Manager **Jules Schneider** will supervise 40 people in assembly, integration and production at KSC.

Tassin sees the CEV win as important for one other reason.

"The last few years have been tough with *Columbia*, the first Return to Flight mission not quite right last summer, and then Katrina. This group has had more than their share of hard times, but I think we've turned the corner now with two successful ET flights this summer and by getting a couple of big wins around Katrina's first anniversary. Things are going to get better." ■

STS-121 crew thanks team for ET performance

Crew members narrate on-board video at the August 30th General Assembly. The footage came from their 14-day mission that launched July 4. Clockwise on the video screen are mission specialists Mike Fossum, Lisa Nowak, Stephanie Wilson and Expedition 13 Flight Engineer Jeff Williams.

The crew reacts to humorous remarks made by ET Program Manager Wanda Sigur during the General Assembly. Astronauts completed three space walks and delivered two tons of equipment and supplies to the space station. From left are mission specialists Piers Sellers and Lisa Nowak, commander Steve Lindsey, mission specialists Mike Fossum and Stephanie Wilson, and pilot Mark Kelly.

Karas discusses Michoud vision

Wow! What a month.

With the Crew Exploration Vehicle (CEV) and Commercial Orbital Transportation Services (COTS) contracts under its belt, Michoud Operations also received word of a favorable repositioning – that it has been named part of the Human Space Flight line of business (LOB) within Space Systems Company.

Executive Vice President **Joanne Maguire** announced the strategic realignment August 21. Human Space Flight consolidates the current Space Exploration LOB with Michoud, related activities at Stennis and the company's involvement in United Space Alliance.

John Karas is overseeing the newly expanded LOB. "We are one big family, with a large portfolio that allows us to leverage our capabilities with greater synergy."

This synergy enables Michoud to participate in teaming opportunities never before possible. "My job is to work 24/7 to find new work and new business for this facility," Karas told employees at a recent town hall meeting.

With its high quality work force and lower rates, compared to other parts of the country, Michoud is poised for a variety of potential new work including other launch systems and commercial aircraft parts fabrication.

John Karas (right) discusses technical questions with engineers Harry Nelson (left) and Mark Pokrywka after the town hall meeting Sept. 6.

These projects would help bridge the employment gap as the ET program winds down by 2010. In addition, NASA has declared that Michoud will be the production site for *Ares I* (Crew Launch Vehicle), *Ares V* (Cargo Launch Vehicle) and Earth Departure Stage.

"We are here for the long haul – all work will go through Michoud. The future is looking pretty good," Karas exclaimed.

"First, delivery on the External Tank Program is priority one," he emphasized.

At an informal town hall meeting, employees meet John Karas and discuss recent program wins and a brighter future for Michoud Operations.

"If we stub our toe on ET, everything else is simply not possible." Karas challenged employees to successfully complete the program while delivering 100% Mission Success as Michoud transitions into CEV and COTS.

Critical skills will be needed on ET and all new programs. Employees will be expected to move seamlessly from program to program when and where their expertise is required.

Karas recognizes that Michoud employees have performed incredibly well through continuing adversity. "I thank you and praise you for your hard work and dedication to deliver quality products to NASA and to our astronauts who fly our products every day." ■

Stine named finance director

Lockheed Martin promoted **Stuart Stine** to finance director in Business Operations, effective August 28. He reports to Brent Clayburn, director, Business Operations. Stine previously served as senior manager of Estimating.

Stine started his Lockheed Martin career as an estimator on the ET Project in 1983 after working four years in financial management for the Vought Corporation in Dallas.

In 1988 he transferred to Corporate Headquarters in Bethesda, Maryland where he was an administrator in Financial Planning & Analysis. Two years later he returned to New Orleans to serve as manager of Management Systems & Audit, including a tenure as Ethics Officer.

Stuart Stine

Stine initiated the Finance Leadership Development Program at Michoud Operations in 2002 and has been the site administrator and instructor since its inception.

A native of Midland, Texas, he earned bachelor of Business Administration degrees in Finance and Marketing from the University of Texas at Arlington in 1978. He also obtained an MBA degree from Tulane University in 1996.

Stine currently serves on the Southeastern Louisiana University Computer Science and Industrial Technology Advisory Council. ■

STS-115 honorees and Ride-Out Crew visit KSC

Unfortunately, these honorees didn't get to see the launch, but they spent several days touring Kennedy Space Center and surrounding area. Recognized for their outstanding performance are (kneeling left to right) Harvey Jackson, Danny Winn, Andrew Booth, Brian Peterson and Lance Luu (Tayco). Second row: Richard Smith, Glenda Caston, Clifford Burke, Andrew Williams, Thu-Phong Nguyen, William Torres, Steve Fredrick, Westley Bayas, Steven Hanberg and Sue Richardson (Goodrich Fuel & Utility Systems).

The second group of the Hurricane Katrina Ride-Out Crew visiting Kennedy Space Center included (from left) Monroe Frazier, Guy Jackson, Dan Doell, John Pucheu, Roland Williams, Mike Moore, Malcolm Wood, William Hale, Steve Francis and Donald Bollich.

K-1 furthers Michoud role in space transportation

To bridge the gap between the fly-out of the Space Shuttle program and the first launch of the Crew Exploration Vehicle (CEV), NASA is looking to the commercial market for transportation into low Earth orbit.

With that goal in mind, the agency recently selected Rocketplane-Kistler (RpK) and SpaceX for the Commercial Orbital Transportation Systems (COTS) contract to demonstrate that their vehicles could provide resupply services to the International Space Station once the shuttle is retired.

Michoud Operations first joined the Kistler K-1 vehicle team (now Rocketplane-Kistler) in 1998. With the COTS contract in place, Michoud will again be engaged as a major subcontractor on the launch vehicle.

The K-1 program received its Authority to Proceed on September 11, according to **Bob Simms**, director, Program Management & Advanced Programs. The program has been on hold since 1999, so the team must spend several months assessing hardware and tooling status, and developing a program implementation plan before any fabrication begins.

Lockheed Martin will design and build four different configuration tanks and other related components for the K-1 vehicle at Michoud. Prior to the program's shutdown, the first stage Launch Assist Platform Liquid Oxygen (LO2) tank and the second stage Orbital Vehicle LO2 tank had been designed and fabricated.

These existing tanks will be inspected to ensure that long-term storage did not impact their flight readiness, Simms explained. The remaining tanks are partially assembled, but additional hardware will have to be fabricated and tooling re-installed before they can be completed.

Lockheed Martin will also be responsible for final assembly, integration, and checkout of the K-1 vehicle. Michoud will assemble both stages and – working closely with other RpK subcontractors – will install the propulsion, electrical and landing subsystems. Once complete, the stages will leave Michoud and be transported to RpK's launch site in Woomera, Australia. RpK anticipates successfully demonstrating the vehicle to NASA in late 2008.

"We are thrilled to be able to re-start the program and to help Rocketplane-Kistler with this exciting program," says Simms, the K-1 program manager since its inception. "Completing the first vehicle and getting the stages ready for a demonstration flight in two years is a challenge that the Michoud team looks forward to."

RpK touts the K-1 as the world's first fully reuseable orbital launch vehicle. After completing the mission, both stages will return to the launch site via a system of parachutes and airbags.

The K-1 also boasts a quick turnaround time, creating the opportunity for a launch-on-demand service. RpK anticipates producing a vehicle that can be used for a minimum of 100 flights, recovering its cost in no more than 10 flights.

"We had two wins, K-1 and CEV, in two weeks that will help maintain and grow our workforce," says **Randy Tassin**, vice president, Program Management & Technical Operations. "The K-1 is probably going to require around 200 people. Add that to CEV, and it becomes pretty significant." ■

Michoud teams for *Ares I* success

Lockheed Martin Space Systems has teamed with Alliant Techsystems and Pratt & Whitney Rocketdyne in preparation for NASA's *Ares I* Upper Stage procurement, planned for early 2007.

ATK is responsible for the *Ares I* first stage hardware, which includes the interface and separation with the upper stage. Lockheed Martin is providing the avionics for the early *Ares I* -1 test flight – and is a recognized industry expert on large cryogenic tanks that are essential to *Ares I* success.

Pratt & Whitney Rocketdyne is responsible for the liquid-fuel J-2x engine and related interfaces with the main propulsion system of the *Ares I* upper stage.

Much of the proposed Lockheed Martin role would take place at Michoud. Engineering support and other activities will be performed by the Space Systems team in Denver.

As each company has participated in some capacity on every U.S. human space flight program, the three will leverage their experience and capabilities to minimize program costs, maintain aggressive development and test schedules, and reduce the technical risk on *Ares I.* Previous experience, coupled with new state-of-the-art processes and technologies, will provide the necessary elements to meet the challenges that lie ahead.

"Each team member brings unique and complementary strengths and capabilities in the areas needed to ensure the success of NASA's vision of returning humans to the moon and going on to Mars," said **John Karas**, vice president, Human Space Flight for Lockheed Martin Space Systems. "We have an excellent track record of working together as a team on such successful programs as the Space Shuttle, Titan IV and Atlas launch vehicles, as well as numerous defense programs."

An office will be established in Huntsville, Alabama for pre-proposal support, transitioning to proposal preparation and will later function as a Joint Program Office after contract award. All three companies will provide personnel for on-site support at the Marshall Space Flight Center. ■

Milestones

Employees celebrating anniversaries with Lockheed Martin in October

30 Years
Lonnie Peshek
Clay Robinson
Howard Rowland
Dale St. Romain

25 Years
Deborah Chavez-Pittman
Brent Clayburn
Cheryl Franckiewicz
Hugh George
Norman Harris
David Henry
Christi Johnson
Gary Kathmann
Philip Lapara
Conrad Lillis
Belinda Randolph
Leon Simmons
Herbert Smith
Irvin Verdin
Gary Willett

20 Years
Paula Frazier
Samuel Gable
Mark Rohlinger

10 Years
Derick Juneau
Daniel Lizana
John Nussbaum
Toma Sharkey

5 Years
Zachary Loftus
Garrett Lopez
Glenn Marx

Congressman tours Michoud

Congressman Ken Calvert (R-Calif.), second from left, poses with John Karas (left), head of Lockheed Martin's Human Space Flight organization; Scott Horowitz, NASA associate administrator for Exploration Systems; and Patrick Scheuermann (right), NASA Michoud chief operating officer. Calvert chairs the House Subcommittee on Space & Aeronautics, which oversees NASA programs.

ET-123 off to Kennedy Space Center

Wearing an appropriate shirt, Steve Wilson, Transportation & Handling lead, guides ET-123 as it swings toward Michoud Harbor. The tank left Thursday on its five-day trip to KSC.

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