

Mission Success Bulletin

April 30, 2007

on-line

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Atlantis to return to pad when repairs done

USA, Lockheed Martin crews making good progress; STS-117/ET-124 set to launch in June

Repairs continue on ET-124, the victim of a punishing hail storm February 26 that inflicted more than 2,500 impact damage sites to the tank's foam insulation and delayed *Atlantis* from its March 15th flight date.

Lockheed Martin's KSC Operations and a small engineering team from Michoud have helped facilitate the repairs that fall into three areas – sand and blend, foam pours and hand sprays to two of the worst-damaged regions of the Liquid Oxygen Tank.

At press time for this article, United Space Alliance (USA) personnel had completed sand and blend repairs, and were well into the foam pour repairs on the tank. Concurrently, a team of 25 is preparing to fly to Kennedy Space Center from Michoud to coordinate and perform the two critical hand sprays.

To conduct a hand spray such as this at KSC means intensive rehearsals that start at Michoud. **Mike McBain** led the 27-person Pencil Sharpener Demonstration Team that created the exact conditions at Michoud in which foam sprayers would perform under at KSC.

The multi-disciplined team cordoned off a part of Final Assembly. After designing a high fidelity foam mock-up of the top of the tank, the team replicated the precise access and narrow space around the platform in KSC's Vehicle Assembly Building. Then the team practiced the hand spray and tested and dissected the foam.

"We reported the results, and all the results were acceptable," McBain said.

The team members then practiced with a portable pencil sharpener

instrument built by Tooling for machining and trimming the foam. The instrument will accompany them to KSC to complete the final trims.

The team also practiced machining the sprayed on foam to meet strict interface requirements for the Gaseous Oxygen Vent Hood (beanie cap) that sits atop the tank on the pad.

He has spent much of his time at KSC coordinating with Marshall Space Flight Center and Michoud on engineering disposition and providing input to KSC Operations for coordination with KSC and USA for direction to USA technicians.

"This whole repair process is complicated and takes a lot of coordination and integration, but we're



In KSC's Vehicle Assembly Building, USA technicians Brenda Morris (left) and Brian Williams apply foam and molds to areas damaged by hail on ET-124. The red material is sealant tape so the mold doesn't leak when the foam rises against the mold.

The first foam spray on the aft ogive of the Liquid Oxygen Tank measures 41 inches longitudinally by 100 inches circumferentially. The second spray on the pencil sharpener area of the forward ogive measures 20 inches by 225 inches and about 300 degrees radially around the top of the tank.

Jim Feeley, senior manager, ET Launch Integration, has estimated four schedule days for prep, spray, and trim.

making progress," notes Feeley.

Normally, **Bob Atkins'** KSC Operations group of 20 provides the everyday technical interface between the ET Project and KSC. Since the fateful hail storm, however, the work atmosphere has been anything but normal. Because of the extent of the foam damage, KSC Operations has covered the ET-124 assessment and repair process 24/7.

Continued on Page 3

Army Corps completes Michoud floodwall rebuilding

The U.S. Army Corps of Engineers conducted a final acceptance inspection on February 12 for work to repair floodwalls at the Michoud Assembly Facility and along a section of the Gulf Intracoastal Waterway (GIWW) that were damaged by Hurricane Katrina.

Representatives from NASA, Lockheed Martin, Boh Brothers Construction, the Orleans Levee District, and Entergy were among those in attendance.

Michoud's flood protection system sustained considerable damage when Katrina's storm surge scoured large sections of its east and west levees that support concrete I-walls. In addition, several barges broke loose from their moorings during the storm and hammered the I-wall near the out-flow pipes of Michoud's pumping system.

"The Corps contracted with Boh Brothers Construction in early 2006 to conduct the repair work, which was completed in December," said **Bernie Zagorski**, construction engineer, Facility Operations & Services.



Barges washed up on Michoud's levee during Hurricane Katrina, damaging the I-wall.

Boh Brothers began repairs by hauling in several hundred thousand cubic yards of clay and dirt to reinforce the levees supporting the I-walls. Workers also poured a concrete slab on top of the soil wall to add strength and protect it from future scouring.

On the water side of the levee, the contractor poured concrete to cover the exposed sheet piles supporting the I-wall. In addition, workers laid an anti-scour system to prevent erosion.

Near the out-flow pipes of the pumping station, the construction company drove 80-foot sheet pilings into the soil to prevent seepage under the levee.

"We're quite satisfied with the repair work," said

Ernie Graham, NASA project engineer. "The

Corps has taken dozens of soil samples, and the earth holding the I-walls is strong. However, we are pressing firm with them to raise our plant-south levee back to its original 20 feet."

The Corps of Engineers recently canceled its plan to raise Michoud's earthen levee in favor of building two floodgates and a levee protection system between the Mississippi River Gulf Outlet and the GIWW. The Corps considered raising Michoud's earthen levee as an unnecessary redundancy.

Graham said he is uncomfortable with the Corps' decision because the floodgate work will not begin for another six to 12 months, and the total project is projected to take five years to complete. "There are a lot of hurricane seasons between then and now."

To the plant's north, the Corps is studying the possibility of building a levee system east and west of Michoud

along the CSX Railroad main line to the Citrus-New Orleans East Back Levee.

"This will give us protection from tidal surges flanking us from Lake



Near Michoud's pumping station, the Corps of Engineers' contractor drove 80-foot sheet pilings to reinforce the I-wall and poured flowable concrete to prevent erosion at the wall's base after Hurricane Katrina.

Pontchartrain," Graham added.

Since Katrina's destructive forces 20 months ago, the Michoud Assembly Facility has undergone a transformation to ready itself for future hurricanes.

Roofs damaged by the storm and now repaired meet new building codes for wind resistance. The facility's pumping station, manually operated during Katrina, is now fully functional by remote control. The controls are housed in the new Incident Command Center, built in the center of Building 320 for added protection.

All electrical feedlines are being buried underground to reduce wind damage. And the water well dug after Katrina is available to once again provide Michoud with water in the event potable water from New Orleans is cut off.

"We've come a long way since Katrina, and we're getting better year by year," Graham concluded. ■



View from the East of Michoud's levee protection

Leaders plan Michoud's future direction

With the transition from the Michoud Operations & Maintenance (MOM) contract in December 2008, and the planned fly-out of the Space Shuttle program by 2010, Michoud Operations leadership is aggressively engaged in planning the shape and direction of future activities in the New Orleans area.

Over the past months, the executive leadership team has met to brainstorm ideas, determine expectations and begin setting a strategic course for future business successes.

As part of that effort, three teams have formed to take a closer look at key areas of importance.

One team led by **Mike Gnau**, acting director of Program Management & Advanced Programs, is examining the possible need and potential for developing a Lockheed Martin presence in New Orleans that is not located on the NASA Michoud Assembly Facility.

Over the past six months, Michoud Operations has relocated employees to local offsite locations in order to continue planning work on the Rocketplane Kistler (RpK) *K-1* project and to support the *Ares I* Upper Stage proposal effort.

A facility in the New Orleans area could allow future business development activities without the need to request approval from NASA and could open the door for other related business

opportunities.

A second team led by **Randy Tassin**, vice president, Program Management & Technical Operations, is developing recommendations on how to work in a multi-program, multi-site environment. While in the past, Lockheed Martin's Huntsville Technical Operations and

“As we define our organizational structure for tomorrow, we will shape our own future.”

– Manny Zulueta, Michoud Operations vice president & site executive

Kennedy Space Center Operations have always served in a support role to Michoud Operations' programs, that relationship is evolving.

Today, significant activities at KSC in support of *Orion* and Stennis in support of satellite development demand a reexamination of those historic roles and working arrangements.

The third team led by **Pat Powell**, director of Business Transformation & Best Practices, is exploring the critical mass necessary to maintain Michoud Operations as a vibrant, responsive organization, able to pursue and win future business opportunities.

“As we define our organizational structure for tomorrow, we will shape our own future,” said **Manny Zulueta**, Michoud Operations vice president & site executive. “A first step to shaping

that future is to understand the plans of our NASA customer – and we are doing that. Another step is to create an organizational plan that takes into consideration both the knowns and the unknowns. These three teams are part of that planning process.

“But everyone at Michoud

Operations has a role to play in that future. It starts by doing your job well every day; participate in the planning efforts as requested; and continue to demonstrate the behaviors that will make

us the supplier of choice for NASA exploration programs.”

Additional leaders have joined the planning activities. On April 13, over 100 Michoud managers took part in an all-day meeting entitled “Taking Charge of our Future... 2007 & Beyond.”

Following an overview by Manny Zulueta and a program panel discussion including External Tank, *Orion*, RpK, *Ares I*, MOM and Stennis Operations, participants explored new concepts for operation and recommitted themselves to the continued development and retention of the existing workforce.

Future meeting are being planned and recommendations from the three planning teams should be completed within the next month. Expect to hear much more to come on these important efforts. ■

Prepared for hurricane season?

Whether you're a native or new to the area, use the following checklist as a guide in preparing for hurricane season, which extends from June 1 – Nov. 30.

- Preplan destinations if told to evacuate
- Mark evacuation routes on a map
- Confer with relatives, co-workers and friends about your plans
- Keep handy telephone numbers of your destination
- Take these items when evacuating:
 1. Prescription medicines
 2. Cash
 3. Bedding and clothing
 4. Water, battery-operated radio, first aid kit, flashlight
- 5. Documents, including driver's license, Social Security card, proof of residence, insurance policies, wills, deeds, birth & marriage certificates, tax records, bank & credit card statements, children's academic records, etc.
 - Bring books and games for children
 - Make arrangements for pets
 - Know how to shut off home's utilities ■

www.mafstatus.com is the website for employees to track facility work conditions.

Return to pad

Continued from Page 1

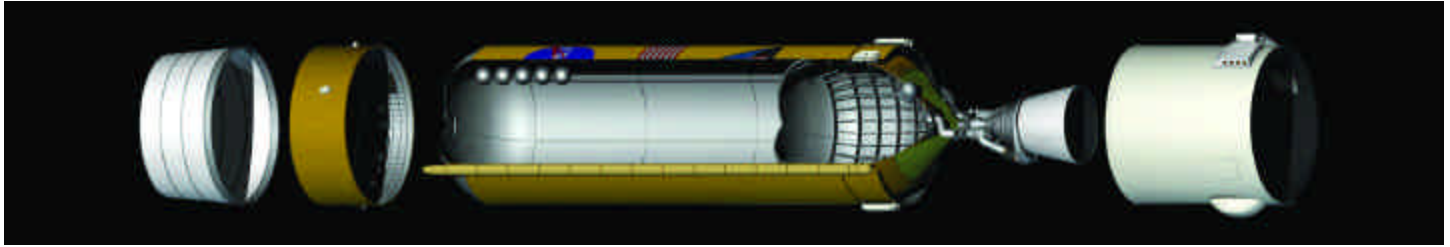
“An event of this nature stretches our group pretty thin, especially since only two of our nine engineers who provide technical support to the ET are dedicated full time to TPS (Thermal Protection Systems),” Atkins says. “Having folks come down from Michoud allows us the capability to monitor the repairs day and night, and it gives us more real-time support for anomaly resolution.”

The window to launch *Atlantis* and ET-124 on the STS-117 mission opens no earlier than June 8. ■



Team Ares submits proposal for Upper Stage to NASA

NASA to name the winner in late August



Earlier this month, Team Ares – made up of lead company Alliant Techsystems (ATK) along with Lockheed Martin and Pratt & Whitney Rocketdyne (PWR) as key partners – submitted its proposal to build the Ares I Upper Stage to NASA.

The April 13th Cost proposal completed the phased process, following the April 2nd Mission Suitability and March 16th Past Performance submittals. Delivery of the proposal was followed on April 17 with an oral overview to NASA led by key members of Team Ares including Chief Engineer **Mike Quiggle**.

“Team Ares focused on using the strengths of each of the different companies in generating the proposal documents,” said Business Development Manager **Glynn Adams**. “Team members contributed in areas where their expertise added value to the proposal effort, regardless of which company is ultimately responsible for the work. This was easily justified, as a win will benefit

each of the companies in Team Ares.”

Realizing the three areas – Past Performance, Mission Suitability, and Cost – may be equally weighted in the competition, Team Ares used the ET contract and the most recent performance on Return to Flight as evidence of Lockheed Martin Space Systems – Michoud Operations capabilities and commitment to Mission Success.

Using historical cost models, Adams explained the team generated a sound proposal that can win, and hopes to gain a foothold as the shuttle program begins to transition to NASA’s Constellation Program for the future.

Upper Stage work at Michoud will include structural assembly of cryogenic tanks to keep those critical skills, final

assembly and check-out. The work would likely generate over 200 positions at Michoud if Team Ares is selected.

Adams also stressed that if Team Ares were successful in capturing the work, this could go a long way in Michoud’s progress toward integrating complete launch systems, including engine, instrumentation and avionics. “When it (the Ares I Upper Stage) leaves here, it will be ready to launch.”

The Upper Stage program can continue the companies’ legacy in space exploration. Last year, Lockheed Martin won the contest to build the Orion spacecraft that will sit atop Ares I.

In commenting on the team’s efforts so far, **Ron Wetmore**, vice president, Shuttle Launch Derived Vehicles, sees ATK, Lockheed Martin, and PWR as natural partners. “We came together as a proposal team and meshed well with our human space flight experience – and as a result, were able to put together a quality proposal.” ■



Orion program manager addresses Michoud team



Cleon Lacefield (left), Orion vice president & program manager, and Jim Bray, Michoud program manager, presented a program overview at an Orion All Hands meeting on April 17. Lacefield discussed state-of-the-art avionics, walked the team through an Orion launch sequence, and presented a detailed scope of the organizational program structure at NASA centers throughout the country. Richard Harris, deputy program manager, Production Operations, updated the two-year plan for putting production and manufacturing operations in place at the KSC Operations & Checkout Building. Michoud Operations will manage Orion’s final assembly and integration in the O&C Building.

K-1 Program focusing on vehicle assembly and tooling

In August 2006, Rocketplane Kistler (RpK) entered into a \$207 million Space Act Agreement with NASA's Johnson Space Center to demonstrate its K-1 vehicle's capability to service the International Space Station. A successful demonstration could open new markets and pave the way for future contracts to launch and deliver cargo and crew to the ISS.

Shortly thereafter, RpK contracted with Lockheed Martin Space Systems – Michoud Operations to continue the design, fabrication and assembly of the vehicle's propellant tanks. RpK also selected Michoud to lead the activity to perform final assembly and integration of the first and second stages for the K-1 launch vehicle.

In February, Lockheed Martin successfully completed a Vehicle Assembly Requirements review with RpK and its subcontractors, and received the go ahead to start vehicle assembly. On March 29, Marshall Space Flight Center officially signed an additional Space Act Agreement with RpK, allocating manufacturing space at Michoud to the K-1 Program.

Lockheed Martin had previously designed and built several major elements of the K-1 vehicle, and with the Space Act Agreement in place, work has resumed to complete these major assemblies.

The Liquid Oxygen Tank for the first stage of the K-1 launch vehicle is completed and ready for final assembly.

Michoud has also received several external skin panels manufactured by Northrop Grumman, and they will soon be ready for assembly. Work on the Lockheed Martin-provided skirt panels is in progress, and subsequent activities will install three composite panels and associated hardware provided by Northrop Grumman.

The Launch Assist Platform Mid-Body element of the first stage has been chosen as the pathfinder for K-1 vehicle assembly and checkout operations. Work has been completed in Building 303 at Michoud to clear Bay 2 and install the first assembly tool. Once the structural assembly is completed, the focus will shift to installation of various subsystems and thermal protection blankets.

“K-1 is a fast paced development program, and the team is working hard to meet the tight schedule deadlines,” reports **Joe Arves**, vehicle assembly lead.

Tool fabrication personnel who are working with the team have made great progress in completing the tool installation, and drill motors are being procured. Manufacturing Process Plans

and engineering drawings to define the skirt assembly instructions have been formally released. In parallel, Facility Operations & Services is working with NASA to consolidate the Orbiter storage area to provide additional bay space to install the next tools in coming months.



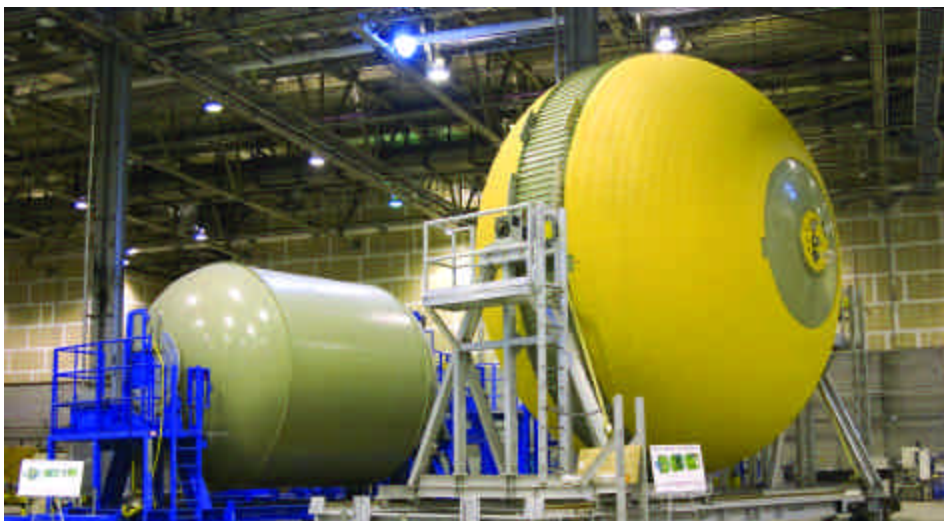
K-1 Program Manager Bob Simms points out to RpK partners a component of the first stage Liquid Oxygen Retention Tank. Michoud work will also include the fabrication, final assembly and integration of several tanks and sub-assemblies.

Office moves

The K-1 team had worked off-site at the Holiday Inn in New Orleans East since September. With the signing of the agreement, the team is now authorized to work at Michoud.

NASA has allocated 8,000 sq. ft. of office space near Materiel Sourcing in Building 350 for the Lockheed Martin K-1 team. This month, nearly 30 members of the team moved in. Remaining team members will move over in the weeks ahead as will new personnel as the program ramps up.

“We are pleased that RpK selected Michoud as the site for final assembly and checkout of the vehicle, and excited to resume working on a program that is part of America's space launch future,” adds **Bob Simms**, Lockheed Martin K-1 program manager. ■



Michoud built two Rocketplane Kistler tanks nine years ago -- the Liquid Oxygen Tank for the second stage (left) and the LO2 Tank for the first stage.

ET Project thanks employees with crawfish boil



Even though it was wet and cold, employees still enjoyed 6,000 pounds of crawfish accompanied by potatoes, corn, and sausage under the tents on April 10. The mudbug luncheon was a way of saying thanks to workers for their job performance during the past year in building and delivering quality ETs that flew safely and successfully. "When the ET performs at a high level, that often translates into an excellent Space Shuttle mission, and employees deserve our gratitude for their attentive work," said Wanda Sigur, ET program manager. The ET Project paid for the employee recognition luncheon from Award Fee funds.



Stepped up security for the Michoud community

In light of recent events, employees might have noticed the increase in security measures around the facility recently. NASA has implemented new policies and procedures that improve safety and promote a secure workplace.

Jim Ford, senior manager, Security, requests employee cooperation in maintaining a secure workplace. “These changes in security require all of us to be vigilant in maintaining a safe and healthy working environment.”

The most significant measure being taken by NASA is the implementation of new badging requirements. All employees will be receiving application forms and they’re encouraged to complete them as soon as possible.



Security officer Brian Carroll stops a speeder on Saturn Boulevard.



Security officer Christopher Ferry prepares to search a vehicle entering Zone 2.

Soon new speed limit signs will be posted along Michoud roadways. The speed limit along major roads has been lowered from 45 mph to 30 mph. In January, Security increased regular patrols, and several employees have lost their driving privileges for speeding on the facility.

With the increase in Protective Services officers, vehicle searches are now done quickly and frequently. As a result, employees who bring weapons or contraband on the facility are being

caught. Parking enforcement has also been ramped up; employees are always encouraged to obey parking directives.

As Michoud continues to grow, there will be an increase in pedestrian traffic. Remember, drivers must give the right of way to walkers or runners.

Protective Services is committed to a healthy, safe work environment. By obeying security directives, employees are doing their part in maintaining a secure workplace and ensuring Mission Success. ■

Michoud Operations adopting CIPS Command Media

In 2003, Lockheed Martin issued Corporate Policy Statement CPS-023, Enterprise Excellence, which requires all companies to adopt the Standard for Integrated Enterprise Processes and to comply with a DoD business model created by Carnegie-Mellon University called the Capability Maturity Model Integrated (CMMI).

To satisfy the CPS, Space Systems Company created a new set of command media called the Common Integrated Process System (CIPS). Space Systems was successfully appraised at a CMMI Maturity Level 3 in December 2005.

In April 2006, then Vice President & General Manager **Marshall Byrd** directed the implementation of CIPS at Michoud Operations. CIPS implementation will not only comply with

the corporate standard, but also fulfill the Space Systems vision of “One Company” where all sites work to a common set of processes.

Since then, Michoud has been working with a team of representatives from all major functional organizations called the Integrated Process Group and the Executive Process Steering Committee, chaired by **Randy Tassin**, vice president, Program Management & Technical Operations. Together, they developed plans for Michoud's transformation from the current Policies, Procedures, and Practices to Space Systems CIPS Command Media.

With the concurrence of **Manny Zulueta**, vice president & site executive, Michoud will begin releasing the CIPS Command Media and retiring standard

procedures this May. “We are implementing CIPS,” Zulueta said. “It is the right thing to do. It is a business necessity.”

Additional communications, training, presentations, and command media bulletins to explain the upcoming changes are planned. The goal of this activity is to culminate in a successful CMMI appraisal in December to verify Michoud's compliance with the CIPS Command Media.

Adopting common processes will enhance Michoud's competitive edge in seeking new business as an integral part of the Human Space Flight Line of Business. For further information, contact Jim McAllister, manager, Enterprise Processes, at 7-5294. ■

Volunteers applauded



At an April 11th luncheon, Lockheed Martin bestowed the President's Volunteer Service Award on 35 employees who contributed 100 or more hours in a year to their community. Alfred Donaldson and Christi Johnson received the Gold Award for 500 hours of community service, and five received the Silver Award for 250 hours. Front row from left: Linda Savage-Regan, Dee Willick, Lori Cantrell, Rebecca Pham, Manny Zulueta (presenter), Mark Cantrell, Charlene Martin-Dauphin (Silver), Diana Blackwelder, Ken James (Silver), and Christi Johnson. Back row: Harold Barrios, Alfred Donaldson, Victor Brown, Netsy Wheeler, John Fisher, Carolyn Baringer, John Pericone, Hank Knighton, Jerry Landry, John Bowers, David Lander, Glen Gilmore, and Kevin Barre'. Not pictured are Bill Burtch (retiree), Coralie Arcement-Buffone, Don Clark (Silver--Huntsville Technical Operations), Brian DeJan, Gordon Dyer, Keith Joiner, Darren Kearney, Marion LaNasa, Scot Marshall (Silver), Ed Peneguy (retiree), Brian Sollberger, and Harry Wadsworth (Silver).

Milestones *Employees celebrating anniversaries with Lockheed Martin in May 2007*

30 Years

Debbie Berkman
Kenneth Borchers
John Bowers
Randall Champagne
Lorri Manning
Dennis Spencer

25 Years

Jeffery Hall
Clifford Jiles
Joel Lobue
Stanley Major
Mike Moreau
Jannette Morrow
Ronald O'Donley

Graham Rashleigh
Martin Rowland
Brian Sollberger
Steven Streetman

20 Years

Richard Kump
James Underwood
Janet Vega

15 Years

Rodney Ashcraft
Pam Gremillion

10 Years

William Hale
Kevin Necaise
P.A. Paseur

John Washington
Daniel Willis

5 Years

Michael Campbell
William Hodgins IV
Raymond Kummerfeld
Gregory Lawless
Walter Miller

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