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LAGNIAPPE

John C. Stennis Space Center

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"Think about it.
When we go to Mars – and we ARE going to Mars –
you will have been part of getting us there."

Ark! Guess who it is? Me – *alligator mississippiensis*, the guest *Lagniappe* commentator for the rest of the year. Never mind the long moniker – just call me Gator. That is what everyone here at Stennis Space Center has always called me.

Did I surprise you – or had you already guessed it was me? It sure has been awhile. Some of you may remember my story. Back in 1965, folks around here were looking for a mascot to boost morale during those hard construction days. Someone suggested a water moccasin or an armadillo. Ark! Can you imagine? One can kill you, and the other one sleeps all but eight hours out of every day. Besides, *alligator mississippiensis* says it all right there in the name. What other mascot could there be for a NASA rocket engine test site in Mississippi?

They used a picture of me on recognition certificates and such. My old friend Charlie Swan – and later Douglass Mayberry – drew me up nice, although they could have made me a little taller. Ark! Then, NASA Public Affairs Officer Mack Herring, started wandering around with me. Before long, he asked me to join him in writing *Lagniappe* commentaries.

Charlie and Douglass finished up their work at Stennis, like a lot of good folk, so Angela Lane draws me now. As for Mack, we sadly lost him in August 2000, and I wandered off the scene for awhile.

Now, I am back, ready to pick up where Mack left off. His final commentary was about all the good years of work done here at Stennis. That included his good work, as well as a lot of other folk – and now, all of you. Think about it. When we go to Mars – and we ARE going to Mars – you will have been a part of getting us there. Those astronauts will ride to space on RS-25 engines just like the one tested here last month. I plan to be around when that new Space Launch System rocket lifts off with those engines firing.

What an exciting time it is to be back at NASA!

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FULFILLING NASA'S EXPLORATION MISSION

Stennis marks 50th anniversary of first hot fire test at site

In April 1966, Lyndon Johnson was president of the United States, protests of the Vietnam War were growing, gas was priced at 32 cents per gallon, (You're My) Soul and Inspiration was the No. 1 song on the Billboard charts, Bonanza was the No. 1 television show in the country and Ronald Reagan was successfully campaigning to become governor of California.

Beyond Earth, the Russian spacecraft Luna 9 was on the surface of the moon, having soft landed in early February to send back the first photos from the lunar surface. Luna 10 was orbiting the moon, the first manmade craft to do so, while the United States was recovering from the Gemini 8 mission, which reached space but had to be aborted within hours because of a thruster malfunction.

Meanwhile, a group of NASA engineers and operators were tucked away in a small concrete building on a misty spring morning in south Mississippi, working last-minute issues in their attempt to test the first Saturn V rocket stage at what later would become Stennis Space Center.

They were entering their 25th consecutive hour as daylight began to grow on the morning of April 23. The countdown to test had begun the previous morning, with high-level visitors and television cameras on the scene to view and record the event.

Issue after issue, not entirely unexpected, arose through that first day and into the night. Some visitors left; others grabbed snatches of sleep wherever they could. Teams of technicians worked through the hours to address problem areas.

Finally, in the dawning gray of the day, a loudspeaker voice was heard, counting down at last into single digits – "5-4-3-2-1 …." The bright red-and-orange flame came first, followed an instant later by the crack of ignition carried across the heavy air. "We have fire in the bucket!" someone announced.

Fifteen seconds later, the flame and sound ended as planned. The first Saturn V rocket stage test was complete, and it's hard to overestimate the impact of the event. The Space Age had arrived in south Mississippi, and the United States was headlong on its way to the moon.

As soon as President John F. Kennedy challenged the United States to send humans to the moon by the end of the 1960s, there was no denying NASA would need a place to test the massive engines and rocket stages needed to meet that challenge. And, as soon as NASA announced plans to build such a test site in Hancock County, Mississippi, there was no denying the historical significance of the work that would be performed there. "I don't know yet what method we will use to get to the moon, but I do know that we have to go through Mississippi to get there," said Wernher von Braun, director of NASA's Marshall Space Flight Center and architect of early U.S. space exploration efforts.

"Go through Mississippi" is just what happened. Forty-three tests and 1,154 days after that first hot fire, Neil Armstrong, who had served as command pilot on that shortened Gemini 8 mission, would take "one giant leap for mankind" onto the surface of the moon. The rocket stages that carried him and 11 others to the lunar surface were all tested at Stennis.

This year, Stennis marks the 50th anniversary of that misty April day in 1966 and five decades of testing excellence in support of America's space program. In all of those years, through both the Apollo and Space Shuttle Programs, no American space mission ever failed as a result of a malfunction in a Stennis-tested engine.

"The record of excellence is continuing as we test engines for NASA's new Space Launch System Program, which will carry humans deeper into space than ever before and eventually to Mars," Center Director Rick Gilbrech said. "What started here in 1966 has grown tremendously. When you talk American space exploration, the road to deep space continues to run through Stennis."

There will be a lot of such talk in coming days. Many engineers and operators who enabled and witnessed the first test still live in the area. Others now working at Stennis are second- or third-generation family members who were brought up on the stories of the site's early days.

"There is a real sense of history at this place," Gilbrech said. "We honor the past, but more importantly, we are adding new chapters to the history of human space exploration."

Indeed, Stennis has grown into the largest rocket engine test site in the nation. It is recognized as a center of excellence for rocket engine testing. NASA's rocket propulsion work across the agency is managed from the site. Every time the United States decides to send humans into space, its turns to Stennis.

Even private companies are doing so, as Orbital Sciences Corporation, SpaceX and Blue Origin all have partnered with NASA to test engines and components at Stennis. Well into its sixth decade of existence and beginning its sixth decade of engine testing, the site continues to prove its worth and value.

NASA conducts its first hot fire test at Stennis Space Center (then known as Mississippi Test Facility) on April 23, 1966, a 15-second firing of a Saturn V second stage prototype (S-II-C) on the A-2 Test Stand.

Stennis employees of the time understood the significance of the testing conducted in those early years. The race to the moon depended on them. However, they probably could only guess at what lay ahead: the 135 space shuttle missions, the variety of commercial engine testing, the upcoming tests to support and enable American's historic return to deep space.

As it turns out, April 23, 1966, was more than just a historic moment in time. It was the opening chapter in a story that continues to grow.

FULFILLING NASA'S EXPLORATION MISSION

Stennis prepares for subscale test project

(Top photo) NASA and Synergy-Achieving Consolidated Operations and Maintenance Contract (SACOM) personnel conduct a liquid oxygen (LOX) cold-flow activation test March 23 at Cell 2 of the E-1 Test Stand at Stennis Space Center. Activation of the cell is in preparation for testing Aerojet Rocketdyne's AR1 rocket engine pre-burner and main injector.

(Right photo) NASA and SACOM perform post-test facility data review following completion of LOX cold-flow activation on the E-1 Test Stand last month.

FULFILLING NASA'S EXPLORATION MISSION

Moonset view from International Space Station

Expedition 47 Flight Engineer Tim Peake of the European Space Agency took this striking photograph of the moon from his unique vantage point aboard the orbiting International Space Station on March 28, 2016. Peake shared the image on March 30 and wrote to his social media followers, "I was looking for #Antarctica – hard to spot from our orbit. Settled for a moonset instead."

NASA in the News

NASA plans global expeditions

NASA is sending scientists around the world in 2016 – from the edge of the Greenland ice sheet to the coral reefs of the South Pacific – to delve into challenging questions about how our planet is changing and what impacts humans are having on it. While Earth science field experiments are nothing new for NASA, the next six months will be a particularly active period with eight major new campaigns taking researchers around the world on a wide range of science investigations. The public is invited to follow online through NASA's social media channels and the new Earth Expeditions web page, which will feature regular video, photos and blog posts from these missions and other ongoing field activities. NASA uses the vantage point of space to increase understanding of the home planet, improve lives, and safeguard the future. To gain a more complete picture of how and why the planet is changing, NASA also sponsors intensive field studies targeting critical science issues that can benefit from a deeper look. To follow NASA Earth Expeditions online, visit: http://www.nasa.gov/earthexpeditions

NASA orders SpaceX crew mission

NASA has awarded an Information Technology (IT) Services contract to SaiTech, Inc. of Bethesda, Maryland, for provision of a wide range of IT services to be performed at the agency's Stennis Space Center. The firm fixed-price contract, with a level of effort component, includes a 17-month base period, two one-year options and a 19-month option, to total five years. The Information Technology Services contract has a potential total value of approximately $43.9 million. Under the contract, SaiTech will provide IT services that include information technology planning, policy and management services, application and system services, audio visual and video services, communication services and technology support services at Stennis. This wide range of information technology services will support Stennis in accomplishing institutional, program and project objectives for NASA, resident organizations, onsite contractors and onsite commercial tenants. For more information about NASA and agency programs, visit: http://www.nasa.gov

Access all NASA news releases online at: http://go.usa.gov/3f3KW.

Advanced exploration systems leaders meet at Stennis

Stennis Space Center hosted Advanced Exploration Systems leaders from across NASA on April 12-14 for their mid-year review. The gathering provided updates on a host of prototype and innovative projects in such areas as robotics, vehicle systems, crew mobility, life support and space habitation. The NASA visitors also participated in a tour of Stennis facilities, which included updates on technologies in use on the A-1 Test Stand and at the high-pressure gas facility. NASA's Advanced Exploration Systems Program focuses on developing and demonstrating capabilities needed for future space exploration missions, such as the 3-D printing technology being tested on the International Space Station to enable in-space manufacturing and the Bigelow Expandable Activity Module (BEAM) just delivered and deployed at the station.

Stennis buildings certified as ENERGY STAR facilities

Alvin Askew, NASA sustainability lead at Stennis Space Center; Randall Pigott, Syncom Space Services (S3) senior lead mechanical engineer; Thomas Mitchell, S3 sustainability champion; and Missy Ferguson, NASA energy manager, display the plaque recognizing Bldg. 3225 on site as a ENERGY STAR facility. The building, along with adjacent Bldg. 3226, are the first two NASA facilities at Stennis to meet the criteria for ENERGY STAR recognition. ENERGY STAR is a U.S. Environmental Protection Agency (EPA) voluntary program that helps businesses and individuals save money and protect the climate through superior energy efficiency. The ENERGY STAR program was established by EPA in 1992 to identify and promote energy-efficient products and buildings in order to reduce energy consumption, improve energy security, and reduce pollution.

Hail & Farewell

NASA bids farewell to the following:

Robert Bruce	AST, Engineer Project Management	Engineering & Test Directorate

April 1966 – Space Age arrives in Mississippi

Note: For more than 50 years, NASA's John C. Stennis Space Center has played a pivotal role in the success of the nation's space program. This month's Lagniappe provides a glimpse into the history of the south Mississippi rocket engine test center.

Fifty years ago on April 23, 1966, Mississippi officially entered the Space Age via the Mississippi Test Facility (MTF) with the first historic static firing of the Saturn V's second-stage prototype, S-II-T, known as the "T-Bird."

During the seventh hour that morning, a heavy mist clung to the ground, and a voice was heard counting down – 5, 4, 3, 2, 1 … Ignition! Suddenly, a loud sound – described by some as a "crack" – broke the morning silence. A bright blast of color overpowered the mist from an explosion of flame.

When the Saturn V first-stage booster was fired at the facility known today as NASA's John C. Stennis Space Center, the noise and blast from the most powerful rocket ever built in America at that time shattered a bank window in nearby Picayune. It also shattered any doubt that the site was prepared to fulfill its mission.

The S-II-T "T-Bird" was the first booster to be tested at the then-Mississippi Test Facility. The historic firing took place on April 23, 1966.

The 81.5-foot-long and 33-foot-diameter stage entered MTF's navigation lock on Oct. 17, 1965, and moved to the stage transfer dock for removal of protective covering and inspection. The next day, it was barged and installed onto the new 200-foot-high S-II (A-2) Test Stand for subsequent testing. Arrival of the "T-Bird" came 29 months after construction began at the site on May 17, 1963, and as the facility was nearing operational status. The initial mission of the rocket proving ground was to test the first and second stages of the Saturn V.

The Saturn S-II played a vital role in boosting America's astronauts to the moon during the Apollo lunar landing missions. The propulsion system for the S-II stage was a cluster of five J-2 engines, developed by North American Aviation's Rocketdyne Division, which generated an aggregated thrust of 1 million pounds or more than 21 million horsepower. The S-II's engines roared to life to provide the thrust to push the spacecraft to a 100-mile orbital altitude.

There were many obstacles that hindered progress leading up to the first engine test. On Dec. 31, 1963, seven inches of snow was recorded at the site This was the beginning of a long, wet, record-breaking rainy season that stopped construction and raised doubts as to whether the project would be completed in time for NASA to meet its lunar landing target date.

NASA had to use surplus Army halftrack troop carriers to transport employees to work sites. Pumps chugged a full throttle to pull giant puddles of water out of excavations. By the end of January 1964, most work was completely halted because of 9.5 inches of rain had fallen. Several feet of water stood in the bottoms of excavations for the navigation lock and in the giant holes dug for the foundations of the A-2 and B-1/B-2 static test stands.

On Sept. 10, 1965, Hurricane Betsy slammed into the Mississippi-Louisiana Gulf Coast. A fixed crane on the A-2 test stand was ripped off during a load test, even before the S-II simulator could be mounted for checkout.

The first S-II-T test, scheduled for Jan. 2, 1966, was plagued with problems. Then, on April 22, it was postponed as the MTF workforce worked through the night. However, the employees' hard work paid off on Oct. 11, 1968, when three astronauts on NASA's Apollo 7 mission made the first manned orbital flight aboard a craft whose engines had been tested at the Mississippi site. Astronaut Neil Armstrong became the first human to set foot on the moon on July 20, 1969. Six more moon missions would be conducted before the Apollo Program ended December 7-19, 1972, with Apollo 17.

The last rocket stage test for the Apollo Program conducted at MTF was Oct. 30, 1970.

Office of Diversity and Equal Opportunity

Ensure diversity and inclusion in the workplace

The following article was written by Pat Fairley, deputy chief financial officer in the NASA Office of the Chief Financial Officer at Stennis

"We need to give each other the space to grow, to be ourselves, to exercise our diversity. We need to give each other space so that we may both give and receive such beautiful things as ideas, openness, dignity, joy, healing, and inclusion."

Max de Pree

Diversity and inclusion are integral to mission success at NASA. Commitment to these principles helps to ensure fairness and equity in hiring and decision making. Diversity and inclusion engages and utilizes the talents, backgrounds, and capabilities of individuals and teams to create and maintain a work environment where diverse ideas are highly valued. NASA strives to build and maintain an environment in which employees are encouraged to offer their viewpoints and perspectives before critical decisions are made. To do so, NASA must cast the widest net possible on all hiring actions and be an organization where the expression of ideas and opinions is welcomed and encouraged.

NASA Policy on Diversity and Inclusion (accessible online at: http://go.usa.gov/ctCbk)

Stated in simplest terms, diversity is variety. Variety is defined as the quality or state of being different or diverse; the absence of uniformity, sameness, or monotony. In essence, it is the characteristics that make us similar and those that make us different.

Diversity means more than the race, sex or physical abilities of an employee. Diversity is also about cultural differences, lifestyle, age, background, experience, religion, economic and social status, sexual orientation and marital status. Inclusion is essential at work, so everyone has the opportunity to fully apply themselves to the success of the organization – and so everyone is valued for their specific skills, experience and vision.

Diversity is successful when it encompasses every level of the workforce. A devotion and commitment to diversity must begin at the top with senior leadership and continue to the newest hire, student trainee (intern) and/or apprentice. The agency's greatest asset is its employees. NASA seeks to harness the collective uniqueness of those assets. When employees know they are making a real difference when bringing diverse ways of thinking to the table, the results should be positive outcomes.

As we strive to ensure the principles of diversity and inclusion are embedded throughout the organization, we must leverage the unique perspectives of our employees to deliver innovative solutions, services and products that are as diverse as the world we live in.

To summarize the quote by Aristotle – "The whole is greater than the sum of its parts" means what people can accomplish working together is greater than they could accomplish each working individually. Everyone has strengths, but when you combine those strengths, they produce something more than the individuals could accomplish alone.

Stennis hosts Women's History Month program

Stennis Space Center Associate Director Ken Human (r) stands with participants in the 2016 Women's History Month program on site March 16. The program featured a panel discussion set in the year 2036, a historic time with all major areas at Stennis headed by women. Participants posed as leaders of NASA, NASA Shared Services Center, the Naval Oceanographic Office, the Naval Research Laboratory, the Naval Meteorology and Oceanography Command and the Stennis Engineering and Test Directorate.

Stennis hosts girls for annual G.E.M.S. event

More than 225 girls from 13 Louisiana and Mississippi high schools visited Stennis Space Center on March 17 to participate in the fifth annual Girls Excited About Math and Science (G.E.M.S.) event. The yearly event featured various motivational presentations and activities, including a "Dress for Success" fashion show. Other topics included a "Day in the Life of An Engineer" presentation, a speed mentoring panel discussion, a talk about social media resumes and activities focused on problem solving and innovative thinking. Sponsors for the event included A^{2}Research; Aerojet Rocketdyne; Manufacturing Technical Solutions, Inc.; Pinnacle Solutions, Inc.; and Science Applications International Corporation.

Stennis hosts workshop for community college scholars

Educators at Stennis Space Center recently hosted 44 community college students April 11-14 for a four-day workshop focused on promoting STEM (science, technology, engineering and mathematics) education.

Stennis and other NASA center education specialists conducted the workshop at INFINITY Science Center as part of NASA's Community College Aerospace Scholars Program NCAS. Participants were community college students interested in pursuing a NASA-related STEM career.

"This is a critical program in helping students of today prepare to be STEM leaders of tomorrow," said Katrina Emery, who directs the NASA Office of Education at Stennis. "That is not only vital to the future of NASA and its space exploration efforts but to the future of our entire nation. As the center responsible for testing the engines that will power the space missions of the future, Stennis is just a perfect place for these students to visit and learn."

The workshop schedule featured guest speakers as well as a week-long team project. Speakers included Stennis Deputy Director Randy Galloway; Patrick Whipps, lead of the External Tank Project Resident Office at NASA's Michoud Assembly Facility in New Orleans; Chris Copelan, Stennis education program specialist; and Calvin Mackie, an award-winning mentor, entrepreneur, author and motivational speaker. The students also learned about various NASA missions and programs, and toured Stennis facilities, including a visit to the A-2 Test Stand led by Maury Vander, chief of the operations division in the NASA Engineering and Test Directorate at Stennis.

For the week's project, students were divided into four teams and challenged to design and build a prototype of the next Mars rover and to demonstrate their creation by performing mock missions on a simulated Mars terrain while working alongside NASA engineers and mentors.

The effort required teams to operate like a fictional company and develop a statement of work outlining details of the rover, including production timeline and cost. Stennis leaders served as mentors to the team during the project.

The NCAS program is designed to give students an authentic NASA experience and to encourage them in completion of their two- or four-year degree. Students participating in onsite visits this year were selected for the program after completing a five-week online course on past, present and future Mars missions.

NCAS is funded, in part, by the agency's Minority University Research and Education Program, which focuses on recruitment of underrepresented and underserved students in STEM fields. The effort is part of NASA's overall commitment to encourage students to pursue studies in STEM-related fields and to consider space-related careers.

During the NASA Community College Aerospace Scholars program at Stennis Space Center on April 11-14, four teams of students (above photo) listened to presentations from speakers such as author/entrepreneur Calvin Mackie (right photo) and designed prototype Mars rover robots (upper right photo) to compete in a simulated mission.

NASA recognizes Stennis engineer for Top 100 technology

A monitoring system developed by Scott Jensen of Carriere, Mississippi, an engineer at Stennis Space Center, has been recognized as one of the Top 100 NASA-developed technologies.

Jensen recently received a certificate of achievement for development of a wireless, one-way, sensor-to-base station monitoring system for explosive and non-hazardous environments. Developed a number of years ago, the system has gone through several iterations and uses at Stennis, been patented and previously used commercially.

The recognition was part of the Create the Future 2015 Design Contest sponsored by the NASA Tech Briefs group. Each year, the group sponsors a public design contest to help stimulate and reward engineering innovation. As an offshoot of that ongoing effort, the group hosted last year's contest to recognize the leading all-time agency technologies. The goal was to identify and illustrate the scope and impact of NASA technology.

Scott Jensen

"Stennis engineers have invented technologies that are used here, at other NASA centers, on the International Space Station, and in industry," said Duane Armstrong, chief of the Stennis advanced technology and technology transfer branch. "Scott's recognition is another indicator of the state-of-the-art work performed at Stennis every day."

Jensen's monitoring approach allows sensors to relay critical systems information from hard-to-reach places. The relayed information can include a variety of measurements, such as pressures, movement and temperatures. For instance, the system was used during a dock repair project at Stennis to monitor how work was impacting the piling infrastructure.

A key feature of the system is it allows sensors to work only when needed. Many systems allow sensors to go into low-power sleep mode when information is not being collected and relayed. Jensen's system takes that concept even farther, allowing sensors to go into a dormant, no-power mode. The sensors then are reactivated by various triggers, such as a change in system conditions, to collect and relay information.

"It's a very unique feature," Jensen said. "Essentially, you can set it out there and forget about it until it's needed."

Recognition of the system by NASA is very gratifying considering the time and energy that went into developing the system, Jensen said. The patent review process alone took about six years. Originally developed to monitor the health and function of valves at Stennis, a critical need for a site handling high-pressure cryogenics, the system remains available for various commercial uses.

A graduate of the University of South Alabama, Jensen has worked at Stennis for more than 15 years.