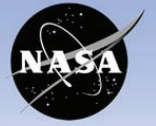


National Aeronautics and Space Administration



LAGNIAPPE

John C. Stennis Space Center

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November 2021



RS-25 developmental engine No. 0525 is raised onto the A-1 Test Stand at Stennis Space Center on Nov. 3, 2021. [See page 4 for more.](#)

The year 2021 has flown by. November is the time of year when south Mississippi landscapes fill with the colors of red and orange, and the trees begin to lose their leaves. The nights become longer, quieter, and cooler. It is an excellent time to step outside, watch the sunset, and stargaze without staying up too late.

Looking up at the night sky has directed and inspired travelers for centuries. To me, it brings wonder and excitement, especially with my binoculars or a telescope. November has been offering clear night skies perfect for getting outside.

This year, November seems to have snuck up on me. Before I knew it, kids dressed up in scary costumes, and October was over. However early it seems, I am glad it is here. November brings some of my favorite holidays.

The first holiday in November is Veteran's Day, which commemorates the men and women who answer the call to defend our country and way of life. Many such veterans now serve in positions throughout Stennis and NASA. Veterans offer another level of diversity with a unique problem-solving approach and commitment to NASA's projects and missions.

Veterans help build the Stennis family. The experiences of a veteran change a person. For some, they have to relearn how to fit in around civilians. They seem a little awkward, but they do not mean to be. It takes effort for them to fit in around people without similar experiences. Thank you, veterans, for your service.

The second holiday is one of my favorites and not just because of the food. Ark. Thanksgiving is an American tradition of community beginning in 1621. Friends, families, and communities come together to celebrate and share in an autumn harvest feast. The word "thanksgiving" reminds me to stop for a moment and think of what I am thankful for in life. Friends and family top the list. Food is not too far down.

One thing I am thankful for is my involvement with NASA. I have the opportunity to support an agency that brings so much to local communities, developing technologies that change the world and expanding the boundaries of what we imagine is possible.

As satsumas turn from green to orange, I take a moment to appreciate the amazing world in which we live, look up at the stars, and dream of how my small part of NASA helps change the future.



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NASA's MOON to MARS MISSION

Major Artemis Engine Part Arrives at Stennis



Two engineers look over an RS-25 powerhead that arrived at Stennis on Oct. 25, after it was pressure tested at Aerojet Rocketdyne's Los Angeles site.

The first four Artemis missions will use NASA's 16 upgraded RS-25 engines that previously powered space shuttle flights. For future flights on the Space Launch System (SLS), NASA and prime contractor Aerojet Rocketdyne are changing the way they build major parts for the RS-25. Engineers and technicians are fabricating some of these parts using advanced manufacturing techniques that increase reliability while reducing both the cost and time to build the engine.

The first RS-25 powerhead produced by Aerojet Rocketdyne in over a decade arrived at Stennis on Oct. 25. Here, it will be installed to a flight certification engine built specifically for testing newly designed parts for the latest production RS-25 engine that will power SLS flights beyond Artemis IV.

The powerhead serves as the structural backbone to the RS-25. It houses three highly complex injectors that produce the combustion to power the engine and acts as a junction for several critical parts, including both high pressure pumps and the main combustion chamber.

Key powerhead components, such as the main injector, heat exchanger, and structural forgings, come with cost and schedule benefits due to the incorporation of advanced machining and forging processes as well as a reduction in welds and part counts, making the powerhead more reliable.

Powerhead unit 7001 recently completed proof pressure testing at Aerojet Rocketdyne's site in Los Angeles. This test required the part to be pressurized beyond normal operating levels, confirming its capability to safely operate the engine.

The new powerhead, along with other engine parts made from advanced manufacturing technologies such as the engine nozzle and main combustion chamber, will undergo hot fire testing on the same certification engine early next year. The manufacturing changes incorporated into this new powerhead configuration are an integral part of NASA's and Aerojet Rocketdyne's strategy to reduce RS-25 manufacturing costs by more than 30% compared to its shuttle predecessor.

Sixteen new powerhead units are currently in production as part of Aerojet Rocketdyne's commitment to deliver NASA 24 new RS-25 engines.

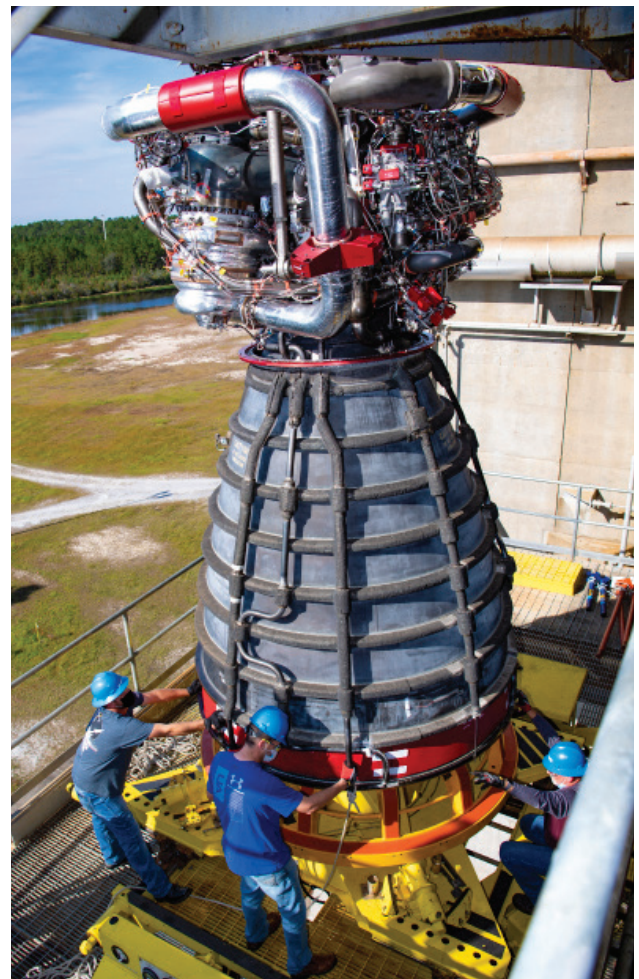
SLS and NASA's Orion spacecraft, along with the commercial human landing system and the Gateway in lunar orbit, are NASA's backbone for deep space exploration. SLS is the only rocket that can send Orion, astronauts, and supplies to the Moon in a single mission. With Artemis, NASA will land the first woman and the first person of color on the Moon and establish sustainable exploration in preparation for missions to Mars.

NASA's MOON to MARS MISSION

NASA Prepares for New RS-25 Engine Testing



A Stennis Space Center crew installs RS-25 developmental engine No. 0525 on the A-1 Test Stand on Nov. 3, setting the stage for a new Retrofit-3 series of hot fire tests. Stennis is testing RS-25 engines for use on NASA's Space Launch System (SLS) rocket. Four engines will help launch SLS on Artemis program missions to the Moon and on eventual missions to Mars. The Retrofit-3 series of developmental tests at Stennis is designed to provide valuable performance data to Aerojet Rocketdyne as the company prepares to manufacture new RS-25 engines for future



NASA's MOON to MARS MISSION

NASA Lowers Retrofit-2 Rocket Engine



A Stennis Space Center crew removes RS-25 developmental engine No. 0528 from the A-1 Test Stand on Oct. 25. Operators completed a Retrofit-2 series of seven hot fire tests of the engine Sept. 30, providing valuable data to Aerojet Rocketdyne as the company begins production of new RS-25 engines. Four RS-25 engines will help launch NASA's new Space Launch System (SLS) on deep space missions to the Moon through the Artemis program and eventually to Mars. Engines for the first four SLS missions have been tested. Now, Aerojet Rocketdyne is collecting performance data to begin manufacture of new RS-25 engines for future missions. During the Retrofit-2 series that began in late January, operators fired engine No. 0528 for a total of 3,650 seconds, including a 650-second test on April 28.

Stennis E-3 Testing Validates Groundbreaking Advanced Diffuser Designs

As NASA sets its sights on launching deep space missions to the Moon and other destinations, Stennis Space Center is developing advanced component designs that could more accurately test the engines needed to power such journeys.

Subscale testing on the E-3 Test Stand at Stennis has validated innovative new diffuser designs to help test rocket engines at simulated high altitudes, helping to ensure the engines will fire and operate on deep space missions as needed.

The experimental testing has demonstrated the effectiveness of a previously untested diffuser design and a new innovative design developed two years ago by Stennis engineers. The test team has compared supercomputer simulations to actual test measurements collected from hot fires of a subscale 3D-printed rocket engine and diffuser models.

A diffuser is a critical component for testing high-altitude engine designs. High pressure around the engine nozzle interferes with the way high-altitude engines are designed to perform and could damage the nozzle itself. A diffuser helps reduce the damage by harnessing the power of a rocket's own exhaust gases to pull a vacuum around the nozzle during a test. It allows the test facility to simulate conditions closer to the low-pressure operating environments found high in the atmosphere and evaluate how a rocket engine will perform during near- or in-space missions.

The diffuser project began as NASA originally planned to conduct simulated high-altitude testing of its Exploration Upper Stage (EUS) unit on the B-2 Test Stand at Stennis. The EUS is being built as a large second stage for use on future missions of the agency's Space Launch System (SLS) rocket. The EUS will be powered by four RL10 engines and will undergo a series of Green Run systems tests, including a hot fire of its four engines, at Stennis prior to its maiden launch.

Stennis engineers began working on a traditional second-throat diffuser design to simulate high altitudes for the test series and hot fire. The traditional design is based on hand calculations developed prior to the 1980s. However, computers and their new Computational Fluid Dynamics (CFD)

capabilities have helped engineers better calculate the effectiveness of such designs and consider more complex and efficient approaches. In this instance, preliminary CFD calculations showed the traditional second throat design would perform poorly for EUS testing.

"Some out-of-the-box thinking was required," said Nick Nugent, a project engineer in the Stennis Engineering and Test Directorate. "Our engineers designed several types of advanced supersonic diffusers to meet the program's vacuum requirements."

Stennis engineers used a centerbody design never before tested at Stennis and an innovative new spike design developed on site. Early CFD analysis showed both the center body and spike diffusers would perform better for EUS testing. However, the computer analysis needed to be tested.

By the time experiments began, EUS Green Run testing requirements had changed and the program no longer needed state-of-the-art diffuser performance. However, Stennis engineers moved forward with a subscale project to test the new designs in the site's versatile E Test Complex.

Testing posed its own set of challenges. First, the teams had to create subscale versions of the test articles, including the RL10 engine that will help power the EUS. Engineers additively manufactured (3D-printed) the subscale engine and used traditional machining methods to fabricate the scaled-down diffusers.

The center body diffuser design also posed a testing challenge. "Typically, a center body (design) in over 4000° Fahrenheit rocket engine exhaust presents a cooling challenge," explained Nick Nugent, a project engineer in the Stennis Engineering and Test Directorate.

The concept itself is sound, but preventing overheating or melting during hot fire testing is crucial. To mitigate the risk, engineers planned hot-fire test durations lasting fewer than five seconds, preventing any overheating during the E-3 test series.

The Stennis team then put the new diffuser designs to the test, collecting data and comparing the performances of the second

throat, center body and spike diffuser configurations. Following an early start, testing at the E-3 location experienced a one-year pause due to the COVID-19 pandemic that hit full force in March 2020. However, test operations resumed once more this year, allowing Stennis engineers to continue their analysis. Test results have been positive.

"This subscale test series has served to validate the aerodynamic performance of those designs," Nugent said. "The type of innovative diffusers that were developed, then tested, will add to the overall knowledge base and significantly advance the diffuser field."

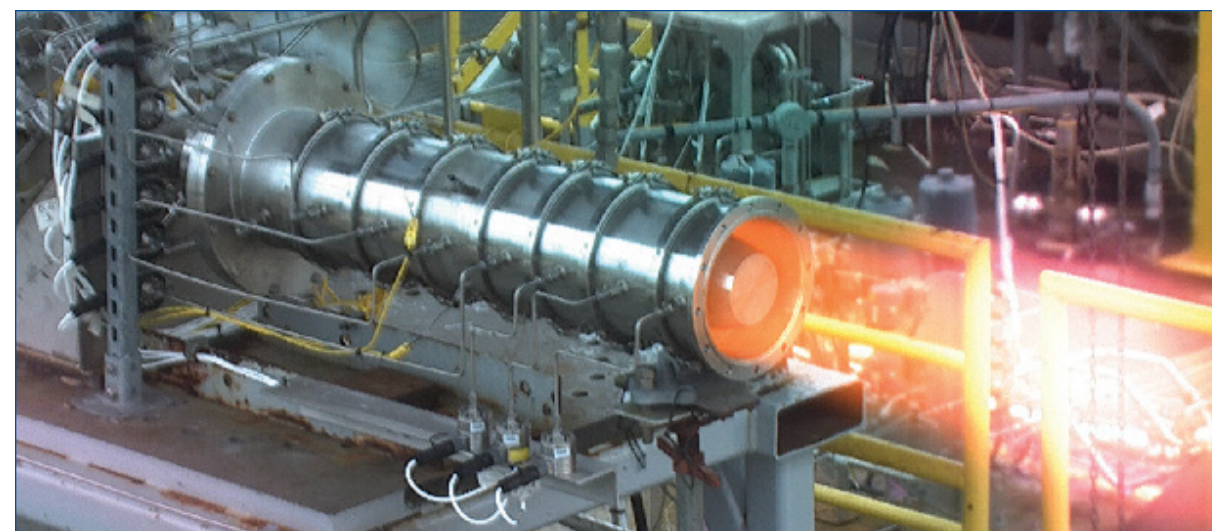
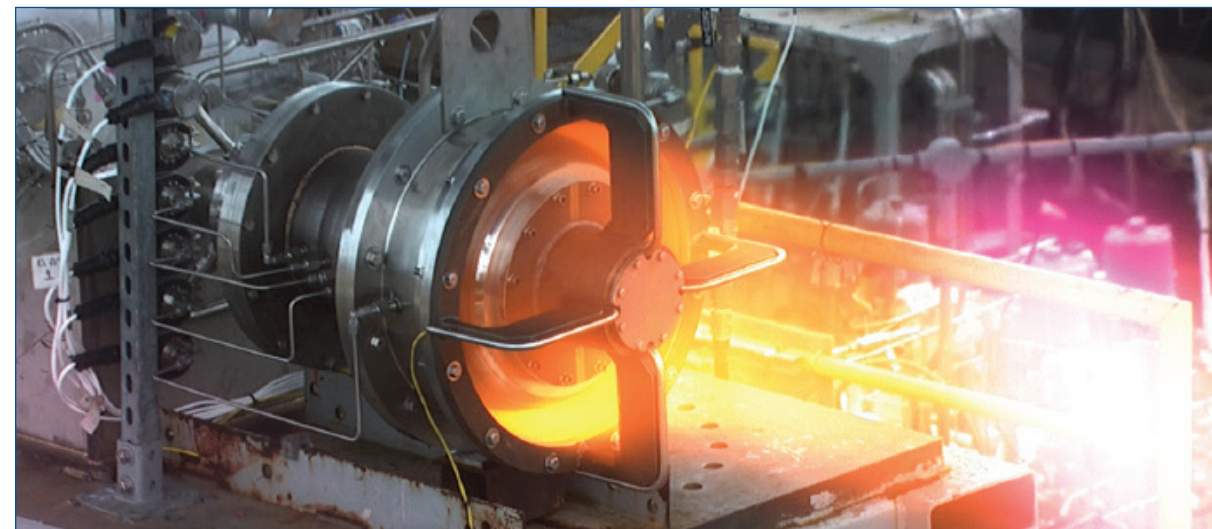
Overall, the test series "has been a proving ground for Stennis' homegrown innovations in hypersonics," added Daniel Jones, a member of the Stennis Engineering and Test Directorate mechanical design and analysis team who served as the lead analyst and aerodynamic designer for the diffuser research project. "The spike diffuser in particular was the very first of its kind to be designed after Stennis engineers invented the technology."

The spike diffuser data has shown the best margin during testing, followed by the center body and the traditional second throat designs. By one measurement, the spike design has shown a 51 percent improvement in performance.

The new data adds a fresh layer to the existing diffuser knowledge base, Jones said. "The series is living up to its 'advanced diffuser testing' label."

Additionally, the additive technique used to create the subscale models is showing potential for manufacturing a full-scale version of the new diffuser designs. Engineers theorize that integration of a cooling network inside the large diffuser centerpiece could help prevent overheating damage during full-duration tests. They are hopeful the 3D-printing technique might overcome difficulties in manufacturing the full-scale integrated network and centerpiece.

In the meanwhile, engineers plan to continue testing of the diffuser designs at least through mid-December, continuing to collect data to learn even more about how the different configurations perform.



The top image shows spike diffuser testing on the E-3 Test Stand at Stennis Space Center. The spike diffuser is a new design developed and tested at Stennis. The center image shows traditional second throat diffuser testing. The image at the bottom shows center body diffuser testing. All of the diffusers are subscale versions. Each diffuser was tested with a subscale version of the RL10-C3. The testing duration was less than 5 seconds per hot fire.

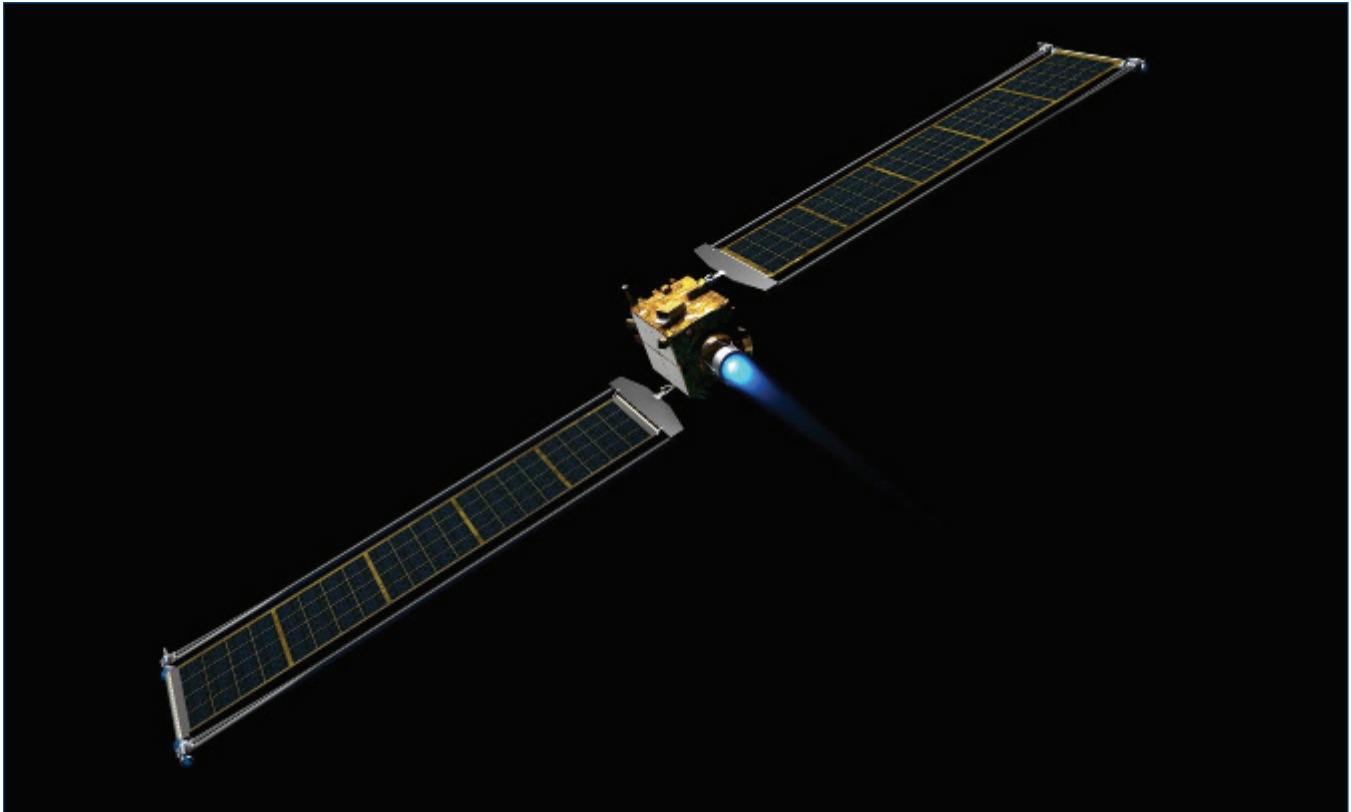
NASA Launches Lucy to ‘Fossils’ of Planet Formation



A United Launch Alliance Atlas V rocket with the Lucy spacecraft aboard is seen in this 2 minute and 30 second exposure photograph as it launches from Space Launch Complex 41 on Oct. 16, 2021, at Cape Canaveral Space Force Station in Florida. Lucy will be the first spacecraft to study Jupiter’s Trojan Asteroids. Like the mission’s namesake – the fossilized human ancestor, “Lucy,” whose skeleton provided unique insight into humanity’s evolution – Lucy will revolutionize knowledge of planetary origins and the formation of the solar system. Credits: NASA/Bill Ingalls

NASA’s Lucy mission, the agency’s first to Jupiter’s Trojan asteroids, launched at 4:34 CDT on Oct. 16 aboard a United Launch Alliance (ULA) Atlas V rocket from Space Launch Complex 41 at Cape Canaveral Space Force Station in Florida. Over the next 12 years, Lucy will fly by one main-belt asteroid and seven Trojan asteroids, making it the agency’s first single spacecraft mission in history to explore so many different asteroids. Lucy will investigate these “fossils” of planetary formation up close during its journey.

“Lucy embodies NASA’s enduring quest to push out into the cosmos for the sake of exploration and science, to better understand the universe and our place within it,” said NASA Administrator Bill Nelson. “I can’t wait to see what mysteries the mission uncovers.” About an hour after launch, Lucy separated from the second stage of the ULA Atlas V 401 rocket. Its two massive solar arrays, each nearly 24 feet (7.3 meters) wide, successfully unfurled about 30 minutes later. For more on Lucy launch and mission, click [here](#).



A NASA illustration shows the agency's Double Asteroid Redirection Test (DART) spacecraft with the Roll Out Solar Arrays (ROSA) extended. Each of the two ROSA arrays is about 28.2 feet by 7.5 feet. DART is a spacecraft designed to impact an asteroid as a test of technology. The DART spacecraft launch window begins Nov. 24, 2021. DART's target asteroid is NOT a threat to Earth. This asteroid system is a perfect testing ground to see if intentionally crashing a spacecraft into an asteroid is an effective way to change its course, should an Earth-threatening asteroid be discovered in the future. The DART spacecraft will achieve the kinetic impact deflection by deliberately crashing itself into the moonlet at a speed of approximately 4.1 miles/second, with the aid of an onboard camera (named DRACO) and sophisticated autonomous navigation software. The collision is expected to change the speed of the moonlet in its orbit around the main body by a fraction of 1 percent, but this should change the orbital period of the moonlet by several minutes - enough to be observed and measured using telescopes on Earth.

NASA in the News

Commercial Crew Returns Safely

The SpaceX Crew Dragon Endeavour spacecraft was successfully recovered after it landed safely with NASA astronauts Shane Kimbrough and Megan McArthur, Japan Aerospace Exploration Agency (JAXA) astronaut Aki Hoshide, and European Space Agency astronaut Thomas Pesquet in the Gulf of Mexico off the coast of Pensacola, Florida on Nov. 8, 2021. Kimbrough, McArthur, Hoshide, and Pesquet traveled 84,653,119 statute miles during their mission, stayed 198 days aboard the space station, and completed 3,194 orbits around Earth. NASA's SpaceX Crew-2 mission is the second operational mission of the SpaceX Crew Dragon spacecraft and Falcon 9 rocket to the International Space Station as part of the agency's Commercial Crew Program, which has worked with the U.S. aerospace industry to launch astronauts on American rockets and spacecraft from American soil to the space station. The splashdown of Crew-2 came just before the launch of NASA's SpaceX Crew-3 on Nov. 10.

Reduced Travel has Unexpected Effects

The COVID-19 pandemic and resulting limitations on travel and other economic sectors by countries around the globe drastically decreased air pollution and greenhouse gas emissions within just a few weeks. That sudden change gave scientists an unprecedented view of results that would take regulations years to achieve. A comprehensive new survey of the effects of the pandemic on the atmosphere, using satellite data from NASA and other international space agencies, reveals some unexpected findings. The study also offers insights into addressing the dual threats of climate warming and air pollution. "We're past the point where we can think of these as two separate problems," said Joshua Laughner, lead author of the new study and a postdoctoral fellow at Caltech in Pasadena, California. "To understand what is driving changes to the atmosphere, we must consider how air quality and climate influence each other." The paper published Nov. 9 in the Proceedings of the National Academy of Sciences. For more click [here](#).

Poem by Gulf Coast Native Recounts the Birth of Stennis Space Center in 1960s

For Ragan Taylor of Bay St. Louis, reading about the 60th anniversary of Stennis Space Center in the October issue of Lagniappe, evoked treasured memories.

Her late father, Bill Taylor, worked as a computer programming for Navoceano on site, retiring in 1995. “He always remarked how lucky he was to fall into the job at a time when there wasn’t much formal schooling in that field,” she said. “He loved working out there.”

In addition, Taylor recalled a poem written by her paternal grandfather many years ago, as NASA was first constructing what now operates as the nation’s largest propulsion test site. “To the Moon via Logtown” was written by William Wesley Taylor in the early years of activity following NASA’s announcement in October 1961 that it planned to build a test site in Hancock County, Mississippi. The verse recounts the relocation of Logtown residents to allow for construction of Stennis.

Residents of five small south Mississippi towns (Gainesville, Logtown, Santa Rosa, Napoleon, and Westonia) were relocated to make way for the new propulsion test site. Gainesville lay within the fee area of the new center, where all facilities now are located. The other four communities were situated in the acoustical buffer zone that now surrounds the fee area. The 125,000-acre buffer zone is a national asset that allows Stennis to conduct large propulsion tests without disturbing area residents and communities.

About 150 landowners were affected by the buffer zone relocations. The end of Logtown came on Sept. 30, 1963, when the community’s one-room post office closed. The relocations understandably made news in the Gulf Coast region – and although Taylor’s family was not affected by the moves, her grandfather reflected on the activity in verse.

His poem begins as a sort of elegy for the former Logtown community, citing the migration of families from their homes, schools, and churches in the area.

With tear-filled eyes they departed
From home to places strange and new
To schools and churches that they built
They built a sad adieu

The poem notes that Logtown was more than just a place or town. It was a haven of memories, where children played, girls kissed their first “beaus,” boys and dogs hunted “by the light of the harvest Moon,” young people went swimming, “and dark always came too soon.” It

continues:

But now those learned men of science
In their frantic race to the Moon
Have erected giant test stands
Where old “Blue” treed the coon ...

Where once there were only cow trails,
And rippling streamlets ran,
Barge canals and highways
Now go from lock to dock to stand

Despite the reminiscing tone, the poem calls readers not to shed tears for Logtown, which had been suffering decline as the logging and lumber trade faltered prior to NASA’s arrival. In William Wesley Taylor’s verse, the arrival of NASA ensured the memory and legacy of the small community. In that way, it echoes the assurance offered to area residents at the time, that through their sacrifice, they were making way for future greatness and achievement.

No, Logtown is not a martyr
As some have eulogized
But had a major role in the Moon race
With her name immortalized

When the Moon race is over
And the Moon is our newest state
Historians will surely write
That the cost was not too great

The closing lines of verse also envision the current efforts of NASA to build its Space Launch System (SLS) rocket to power Artemis program missions to the Moon. Those missions not only will land the first woman and first person of color on the lunar surface but will allow NASA to develop the technologies and capabilities needed for eventual SLS human missions to Mars. The verse concludes:

In future generations
When men glide ’mongst the stars
School kids will read about Logtown
In history books on Mars

Taylor said it is an honor to share her grandfather’s poem with others. Although he died before she was born and before astronauts reached the Moon in 1969, Taylor said she is sure he would have joined others on the Gulf Coast in celebrating the historic achievement. “I feel like he would have been amazed by the Moon landing and the technological advancements made possible by NASA,” she said.



Employees of the Logtown Post Office lower the U.S. flag for the last time in 1963, signaling the close of the facility. Residents were relocated from Logtown and other communities in the early 1960s to allow for construction of Stennis Space Center.

ASTRO CAMP Virtually Reaches Hispanic Children

This summer, the NASA ASTRO CAMP Collaborative Partners (ACCP) team seated at Stennis Space Center went beyond usual efforts to reach large nontraditional audiences, most specifically children of Hispanic migrant workers in Yuma, Arizona.

The ACCP team partnered with the Yuma School District to virtually reach 595 Hispanic children of migrant worker families. The partnership program provided sessions for campers starting June 6 and continued support through four weeks of camps ending July 16. Plans call for the ACCP program activities to be continued by the Yuma School District throughout the school year.

“The inclusion of the Yuma School District was part of the mission 2021 goal to reach the underserved and underrepresented groups in rural communities,” said Maria Lott, the NASA ACCP project lead at Stennis. “The Yuma group was very enthusiastic about having the opportunity to engage their students with NASA.”

“With the virtual camps, ASTRO CAMP activities have transcended geographic boundaries and allowed broad-reaching community participation,” Lott added.

The outreach effort was possible thanks to a partnership with Yuma School District and an existing Arizona state-operated and federally funded program. Arizona’s program helps fund Migrant Education Programs supporting educational agencies providing services to students of migratory workers.

The Arizona program offers numerous benefits, such as adult education, family outreach, in-home support, language and cultural training, STEM/STEAM programs, out-of-school youth intervention, preschool programming, student leadership opportunities, and summer and

extended day programming, as well as its newest service, NASA ACCP virtual camps.

Students at multiple locations simultaneously participated with staff in highly engaging STEM educational activities. ACCP includes NASA’s Science Mission Directorate activities on astrophysics, Earth science, heliophysics, planetary science and NASA’s NextGen STEM Moon to Mars initiative.

Liz Miranda-Lomeli, the Migrant Summer ASTRO CAMP director, describes the student’s opportunity as an “unforgettable experience.” She added, “This

program is an inspiration for students to pursue future career paths in engineering and science.”

In addition to the Arizona effort, ACCP which is a part of the NASA Science Mission Directorate’s Science Activation Network reached communities far beyond the traditional local population with this year’s activities. The team has a strong history of developing engaging curriculum, including the ASTRO CAMP methodology, then reaching out to communities using existing summer programs and sometimes establishing new programs altogether.

The reach of the NASA ASTRO CAMP program is nationwide and beyond with the latest virtual camp service offered to collaborative partners. In 2021, the program was provided at over 135 locations throughout the United States, extending from Maine to Florida and across the continent to California and Alaska. The most recent activity report also includes four international collaborators.

Looking ahead, the ACCP team continues to look for new ways to broaden the reach of NASA ASTRO CAMP activities. This summer’s virtual camp’s success is a key example of how those efforts are paying off.



Stennis Project Manager Reaches for the Moon

Justin Lucas, a NASA project manager at Stennis, is helping lay the framework for reaching America's new deep space goals. His five-year path with Stennis has proven a once-in-a-lifetime opportunity, and he enthusiastically embraces his part in transforming the Moon to Mars vision into reality.

Lucas remembers being a child and how his imagination ran wild when he first saw a Moon rock on a visit to the Stennis visitor center. "All I could think about was that I wanted to know what it felt like," he said. "Was it smooth? Heavy? Does it feel like a rock on Earth? How far could I throw it on the Moon?"

The curiosity he exhibited growing up in Gulfport, Mississippi, only amplified with age. Little did he know then, he would oversee projects with NASA, dedicating his career to engine testing, space flight, and exploration. In that regard, he is helping make a sustainable human presence on the Moon real, knowing there has not been a human on the lunar surface since 1972.

Still living in his hometown, Lucas has been supporting Artemis missions to take the next man, first woman, and first person of color to the surface of the Moon. As a Stennis project manager, his projects and responsibilities include designing, constructing, and supporting test facility systems and infrastructure within the test complex. "Working at Stennis is challenging, rewarding, and by far the most fascinating career opportunity," Lucas said.

Lucas did not start working for NASA immediately after graduating from Mississippi State University with a bachelor's degree in mechanical engineering. Instead, he started with an aluminum rolling mill manufacturer and recycling center, where he worked for two years, then he worked an additional four years in PET resins manufacturing. "I saw an opportunity within the space program to apply my knowledge and experience at Stennis and felt like I was ready for new challenges and responsibilities," Lucas said. "Since then, I have never looked back."

The opportunities Lucas encounters at Stennis have had a profound impact on his career. "Working with a wide variety of teams on several projects has offered me an opportunity to grow as an individual and a professional," Lucas explained. "Through the diversity and talent of the project teams, I'm able to capture



NASA Project Manager Justin Lucas enjoys a fascinating career at Stennis Space Center supporting rocket engine test operations, including America's new Artemis deep-space efforts, while still living in his home town of Gulfport, Mississippi.

different viewpoints and perspectives. I look forward to supporting Stennis and its partners in the efforts to go back to the Moon and beyond."

With NASA, Lucas also earned his Lean Six Sigma Green Belt Certification. A Certified Lean Six Sigma Green Belt is an individual who is well versed in the elements of Lean Six Sigma Methodology and problem solving, mainly emphasizing: define, measure, analyze, improve and control. He also earned the title of contracting officer representative (COR). COR certification is required to manage NASA direct contracts, including design and construction

Lucas has supported Stennis's efforts as a project manager on preparing the site facilities and B-2 Test Stand for the Space Launch System (SLS) core stage test series. His involvement allowed him to witness the hot fire of the SLS core stage's four powerful RS-25 engines during the Green Run series of tests of the stage and its integrated systems. Those same engines soon will power the rocket on its maiden

Artemis I voyage. Lucas said, "I am proud to see the impacts of my projects as they contributed to Green Run testing."

Lucas reflected on Green Run, saying, "Considering there were so many moving parts and pieces supporting Green Run, coordination and execution of construction and maintenance activities for critical test systems around the testing activities presented many challenges." He helped manage the test's essential systems, including test stand air compressors, the high-pressure air dryer, the air compressor cooling tower control system, High Pressure Gas Facility meters, and the high-pressure gas Phase II activities.

Lucas can see a future at Stennis. "I am most excited to see new developments and partnerships at Stennis and within NASA to get us back to the Moon, build the Gateway (lunar orbiting outpost), and make the journey to Mars," he explained. "I look forward to being part of an organization that drives innovation and inspiration to make that vision a reality. At Stennis, I have an opportunity to witness history in the making."

NASA Officials Visit Stennis



(Top photo) Stennis Space Center leaders meet with a pair of new NASA mission directorate leaders during their visit on-site Oct. 21 - James Free (seated, l), associate administrator of NASA's Exploration Systems Development Mission Directorate; and Kathy Leuders (seated, r), associate administrator of NASA's Space Operations Mission Directorate. Joining Free and Leuders during the visit were: Center Director Rick Gilbrech (seated, c); along with (l to r) Joe Schuyler, director of the Stennis Engineering and Test Directorate; Center Deputy Director John Bailey; Christine Powell, manager of NASA's Rocket Propulsion Test Program Office at Stennis; Gary Benton, director of the Stennis Mission and Safety Assurance Directorate; Patrick Cullen, Stennis deputy chief financial officer; Duane Armstrong, manager of the Stennis Strategic Business Development Office; Center Associate Director Mary Byrd; Rodney McKellip, director of the Stennis Center Operations Directorate; and Troy Frisbie, senior project manager in the Stennis Center Operations Directorate.

(Bottom photo) Stennis Space Center leaders meet with Bob Gibbs (seated, c), associate administrator of NASA's Mission Support Directorate, during his Oct. 13 visit to the site. Joining Gibbs during the visit were: Center Director Rick Gilbrech (seated, l); Center Deputy Director John Bailey (seated, r); Center Associate Director Mary Byrd (standing, l to r); Jamie Krauk, deputy associate administrator for the NASA Mission Support Transformation Office; and Robert Hubbard, program manager for NASA's Mission Support Directorate.



Stennis News

Stennis Employees Conduct On-site Fire Extinguisher Training



A Stennis employee participates in a hands-on fire watch/fire extinguisher exercise Nov. 8. The Stennis Fire Department scheduled training classes throughout November for site personnel and safety teams in need of annual recertification.

Stennis Focuses on Employee Safety

Stennis Space Center employees participated in a virtual Safety Day program Nov. 4, featuring a keynote address by motivational speaker/author Lee Shelby. Shelby recounted details of his work-related accident years ago to implore workers not to be complacent in the workplace and always to find time for safety. Other topics during the virtual emphasis included Understanding Fatigue in These Modern Times and the NASA Safety Reporting System.



Keynote Speaker Lee Shelby addresses Stennis workforce.

NASA Honors Stennis Employee

To mark progress in NASA's Artemis program that will return humans, including the first woman and person of color, to the Moon, the space agency has been recognizing Space Heroes performing necessary and critical work. Overall, 26 Stennis Space Center employees have been cited for their Artemis-related efforts.



Bridget Moody helped enable the Green Run core stage testing at Stennis Space Center and ensured the team could meet all environmental requirements without impact to the test schedule. Her work to proactively engage with state regulators for an off-cycle recertification of the test stand deluge water pumps and generators made sure that they would be available for Space Launch System testing with no schedule impact.

Stennis News

Stennis Employees Conduct On-site CPR Training



Workers at Stennis participate in CPR training at the Emergency Operations Center on Oct. 26. Above, instructor Vance Forrest demonstrates CPR techniques to Wayne East (l to r), David Ladner, and Rustin Wells, all Syncom Space Services (S3) employees. Below, S3 employees Tracy Lee (l to r), Cameron Parker, Wayne East, and David Ladner, practice CPR steps.



Infinity Announces Trivia Winner

During October, INFINITY Science Center held a Facebook trivia contest. Contestants answered questions about Stennis Space Center every week in honor of the site's 60th anniversary. Alan Crudden of Waveland, Mississippi, emerged victorious. Crudden has a history as a NASA contractor and received NASA's prestigious Silver Snoopy for individual contributions to the shuttle orbiter rendezvous flight software. Crudden is a Bay High School graduate who moved on to Mississippi State University to earn his Bachelor of Science in physics and math, but currently resides in Austin, TX.

Hail & Farewell

NASA welcomes the following:

John Boffenmyer
Lauren Green

Environmental Protection Specialist
Management and Program Analyst

Center Operations Directorate
Office of the Chief Financial Officer

New Campaign Recognizes Stennis' Remote Workforce

Stennis Space Center recently announced launch of a “Making a Difference from a Distance” campaign to recognize the contributions of employees who are making a difference while working from remote locations. The campaign is expected to run through mid-December.

The campaign features employees who were nominated by either management or their colleagues and consists of employee profiles representing the offices and directorates at Stennis. On a weekly basis, featured employee profiles will be included in Orbiter and on Stennis social media accounts:

- [Stennis' Facebook](#)
- [Stennis' Twitter](#)
- [Stennis Instagram](#)

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MAKING A DIFFERENCE FROM A DISTANCE

**AARON HEAD
TECHNOLOGY PROJECT MANAGER
NASA ENGINEERING AND TEST DIRECTORATE**

Aaron is an engineer in the Office of Technology Development where he provides technical leadership in several areas, including the Scalable Mobile Autonomous Rocket Test (SMART) capability project. Through the SMART project, he is leading the design for control of a cryogenic liquid methane propellant pump skid, with the goal of providing a scalable mobile test bed with fine control of propellant flow and pressure via semi-autonomous control of electrically driven pumps. He also has served as the laboratory manager for the Autonomous System Laboratory (ASL) and has successfully developed a plan for remote access to the ASL.

The "Making a Difference from a Distance" campaign features NASA and NASA contractor employees representing SSC who were nominated by either management or their colleagues highlighting the outstanding contributions employees are making in a virtual work setting.

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MAKING A DIFFERENCE FROM A DISTANCE

**ARMANDO DELGADO
E-1 TEST STAND MECHANICAL DESIGN ENGINEER
NASA ENGINEERING AND TEST DIRECTORATE**

Armando has diligently worked in a telework environment, serving as the mechanical design lead for several projects in the E Test Complex. He has supported the design, fabrication, and test activities for Launcher's liquid oxygen turbo-pump test project and thrust chamber assembly test project; Blue Origin's test project; and Virgin Orbit's thrust chamber assembly test project and engine test project in the E complex.

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**BERTHA JACKSON
AUDIT, RISK & METRICS ITSC SUPPORT LEAD
SAITECH
SAFETY AND MISSION ASSURANCE DIRECTORATE**

Bertha planned and organized the agency's first-ever virtual Institutional, Facility, Operational Safety Audit, which required identifying auditees for numerous audit sessions, coordinating multi-level Microsoft Teams meetings amongst agency and center personnel, and providing real-time support throughout the audit. Her untiring efforts led to a successfully executed audit. Positive feedback was provided from both auditors and auditees.

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**BRANDON LADNER
B-2 LEAD MECHANICAL DESIGN ENGINEER
NASA ENGINEERING AND TEST DIRECTORATE**

Brandon has diligently worked in a telework environment while supporting the Space Launch System (SLS) core stage test project at the Stennis B-2 Test Stand. He was the mechanical design lead for multiple large fluid and gas systems that were designed and fabricated to support the core stage testing. He is the mechanical design lead for the design and fabrication efforts in support of the SLS Exploration Upper Stage test project at the B-2 Test Stand.

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**KELLY SULLIVAN
SENIOR ACCOUNTANT
NASA OFFICE OF THE CHIEF FINANCIAL OFFICER**

Kelly serves as a team member on the 1739 Agency Review Panel which decides capitalization/non-capitalization of projects across the agency. Although the telework environment has been new to all of us, it has pushed NASA to develop more agency wide teams and allowed increased collaboration with knowledgeable employees across all centers. This has provided Stennis the opportunity to have a voice and be a part of the bigger picture. This team rotates membership to allow broader understanding of capitalization decisions and work being accomplished across the agency. Kelly volunteered to serve as a member and has done so admirably.

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MAKING A DIFFERENCE FROM A DISTANCE

**KEVIN CAMP
SUPPLY EQUIPMENT MANAGEMENT OFFICER
NASA CENTER OPERATIONS DIRECTORATE**

During the global pandemic, Kevin coordinated all of the shipments of personal protection equipment for both Stennis and the NASA Shared Services Center. He also coordinated the relocation of the Shipping and Receiving department as well as the Redistribution and Disposal department.

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MAKING A DIFFERENCE FROM A DISTANCE

**KAREN SEALS
LEAD, RESOURCES MANAGEMENT DIVISION,
INTEGRATION, EXECUTION & SYSTEMS MANAGEMENT
NASA OFFICE OF THE CHIEF FINANCIAL OFFICER**

Karen did an exceptional job overhauling the occupancy execution process. In an effort to simplify the process, she worked tirelessly to establish a service pool, created a new Work Breakdown Structure (WBS) that reduced WBS codes by over 50%, and mapped the new codes to the existing occupancy categories in support of the Stennis federal city. During these activities she expanded her knowledge base by creating new ways to reconcile the execution data needed to ensure Enterprise and center funding were accurately reflected and costs recovered, all while assisting with the documentation of the new execution process. These are no simple feats and are made more difficult by changes in the normal mode of operation that has been in place for over 40 years.

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MAKING A DIFFERENCE FROM A DISTANCE

**MELISSA WAGNER
CONTRACTING OFFICER
NASA OFFICE OF PROCUREMENT**

Melissa is the contracting officer working propellent requirements for Stennis. Her performance and dedication to ensure NASA's mission is accomplished is unfaltering. Hurricane Ida, as well as the COVID-19 pandemic, impacted propellent suppliers significantly. Melissa was able to communicate with the suppliers and the technical team to maximize product availability through minimal usage in order to keep the center operational, which required her to work weekends and holidays.

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MAKING A DIFFERENCE FROM A DISTANCE

**MONICA WATTS
DEPUTY CHIEF FINANCIAL OFFICER, FINANCE
NASA OFFICE OF THE CHIEF FINANCIAL OFFICER**


Monica has been instrumental in keeping her team engaged in a teleworking environment. She initiated team coffee breaks as an outlet to ensure employees have a way to feel connected while working remotely. Whether employees are discussing work or personal life, these strategic breaks have helped to keep morale boosted in an area that experienced increased requirements during the pandemic.

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MAKING A DIFFERENCE FROM A DISTANCE




CRAIG CHANDLER
EXPERIMENTAL FACILITIES DEVELOPMENT,
RS-25 PROJECT MANAGEMENT DETAILER
NASA CENTER OPERATIONS DIRECTORATE


Major refurbishments of the RS-25 test facility were completed during the pandemic, and Craig helped lead the efforts by developing the RS-25 Planning Programming Budgeting Execution strategies, managing task orders, and supporting critical program management reviews. He also identified potential issues that could have delayed completion of the construction and/or operational work and directly impacted the RS-25 engine schedule. His role in the development of options for controversial issues and well-formulated plans allowed wise decisions to support the RS-25 test project.

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MAKING A DIFFERENCE FROM A DISTANCE




DANNY ALLGOOD
COMPUTATIONAL FLUID DYNAMICS SUBJECT MATTER EXPERT
NASA ENGINEERING AND TEST DIRECTORATE


Danny has successfully worked in a telework environment while supporting several complex analysis tasks. He has performed Computational Fluid Dynamics (CFD) analysis in support of Blue Origin's test project in the E Test Complex. In addition to his work at Stennis, he has performed a complex CFD analysis of SpaceX's launchpad for Kennedy Space Center. He is also the technical monitor for five Small Business Innovative Research projects.

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MAKING A DIFFERENCE FROM A DISTANCE



DIANE SIMS
PARALEGAL SPECIALIST
NASA OFFICE OF THE GENERAL COUNSEL

Diane continues to seamlessly run the center's law office, virtually, without missing a deadline or legal review. She ensures lines of communication are maintained, as coordination is key with all Stennis attorneys and the Headquarters' Office of General Counsel (OGC). Additionally, she successfully assisted in virtually onboarding a legal intern and two new attorneys, ensuring they had the tools to quickly contribute to the center and the OGC Enterprise. During the height of the pandemic, Diane continued to provide invaluable support to the center and the agency while supporting a variety of high-level actions.

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PATRICK CULLEN
DEPUTY CHIEF FINANCIAL OFFICER, RESOURCES
NASA OFFICE OF THE CHIEF FINANCIAL OFFICER


Patrick joined the Stennis Space Center Office of the Chief Financial Officer (OCFO) team during the mandatory teleworking status. Even though all interactions with his team up to this point have been virtual, he has gained the respect of the team he is leading and built great relationships. Also, in less than a year, he has acclimated himself to the operations of the center and submitted the FY 2023 budget all from his home office in Houston. He serves on multiple Enterprise process improvement teams helping to lead the OCFO organization into the future. Patrick has also initiated several process improvements that have saved resources for the OCFO organization, center, and agency.

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RHONDA LAVIGNE
CORRECTIVE ACTION REQUEST MANAGER
SAITECH
NASA SAFETY AND MISSION ASSURANCE DIRECTORATE

Rhonda planned and organized the agency's first-ever virtual Institutional, Facility, Operational Safety Audit, which required identifying auditees for numerous audit sessions, coordinating multi-level Microsoft Teams meetings amongst agency and center personnel, and providing real-time support throughout the audit. Her untiring efforts led to a successfully executed audit. Positive feedback was provided from both auditors and auditees.

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MAKING A DIFFERENCE FROM A DISTANCE



RICHARD WEAR
THERMAL FLUID SUBJECT MATTER EXPERT
NASA ENGINEERING AND TEST DIRECTORATE

Richard has diligently worked in a telework environment while supporting several test projects at the E Test Complex. He has supported the fluid analysis and test activities for Launcher's liquid oxygen turbopump test project and thrust chamber assembly test project, Blue Origin's test project, and Virgin Orbit's thrust chamber assembly test project and engine test project.

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DEBORAH NORTON
NASA CHIEF FINANCIAL OFFICER

Adjusting to the telework environment was not easy, and some employees missed the human interaction of an in-person office setting. In an effort to increase office interactions, Deborah began writing personal notes and mailing them to her team. These notes consisted of words of encouragement or appreciation, birthday wishes, milestone acknowledgements, or just a quick "hello" to let employees know that they are valued during this "different" time in the world! Not only does Deborah find time to support her employees, but she is also responsible for the financial management of the center. During the pandemic, she dynamically led her team through various financial transitions in an effort to support the agency's Enterprise efforts.

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MAKING A DIFFERENCE FROM A DISTANCE



JOHN BAKKER
FACILITY MANAGER, B TEST COMPLEX AND
HIGH PRESSURE INDUSTRIAL WATER SYSTEM
NASA CENTER OPERATIONS DIRECTORATE

John provided invaluable support to the Space Launch System (SLS) core stage Green Run test series. In his role as the B Test Stand NASA facility manager, he ensured the test stand infrastructure was ready to support the historic test. Additionally, John was certified as a visual observer and is training to be a pilot for NASA's Unmanned Aerial Surveillance Program at Stennis. His support was critical to capturing the video footage of the core stage hot fire and the assessment of damage at Stennis and Michoud Assembly Facility from Hurricanes Zeta and Ida.

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KIM DRIEVERGEN
LEAD, MANAGEMENT AND PROGRAM ANALYST
NASA OFFICE OF THE CHIEF FINANCIAL OFFICER

Kim took the initiative to provide an innovative way to ensure successful training while teleworking by developing a one-on-one training process for new and junior employees. She also manages the budget for multiple projects at Stennis Space Center, including the Rocket Propulsion Test (RPT) program. She is an exceptional analyst with great attention to detail and technical understanding of the various projects RPT supports. Her management of these budgets allows for the center to complete testing milestones on time.

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MAKING A DIFFERENCE FROM A DISTANCE



ROBERT WILLIAMS, JR.
STRESS AND STRUCTURAL DYNAMICS ENGINEER
NASA ENGINEERING AND TEST DIRECTORATE

Robert has successfully worked in a telework environment while supporting several testing projects at both the E Test Complex and the B-2 Test Stand. He provided excellent structural analysis support to the Space Launch System core stage test project at the B-2 Test Stand. He also performed structural analysis and oversight to Blue Origin's test project and Virgin Orbit's thrust chamber assembly test project at the E Test Complex.

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THOMAS STANLEY
LEAD AST, TECHNICAL MANAGEMENT
NASA ENGINEERING AND TEST DIRECTORATE

Tom is responsible for managing the agency's Software User Agreement requests and contractor compliances for which he developed tools and procedures, resulting in more efficient processes. Tom spearheaded the development of the Minority University Research and Education Project Small Business Technology Transfer (M-STTR) program and successfully held the kickoff meeting with the 11 selected university teams. The program's purpose is to encourage greater involvement from minority-serving Institutions in the NASA STTR Program.

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MAKING A DIFFERENCE FROM A DISTANCE



TOMMY CARROLL
PROJECT MANAGER
NASA CENTER OPERATIONS DIRECTORATE

Tommy has successfully supported important construction projects all while teleworking. He has been responsible for projects supporting the critical test support facilities of the High Pressure Gas Facility and High Pressure Industrial Water Facility. Additionally, Tommy was certified as a visual observer and is training to be a pilot for the NASA's Unmanned Aerial Surveillance Program at Stennis. His contributions were critical to capturing video footage of the Green Run hot fire and the assessment of damage at Stennis and Michoud Assembly Facility from Hurricanes Zeta and Ida.

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Office of Diversity and Equal Opportunity

Ways to Celebrate Native American Heritage

November is the time to celebrate Native American Heritage Month (NAHM), also known as American Indian and Alaska Native Heritage Month. In 1990, President George H. W. Bush signed a joint resolution declaring November as Native American Heritage Month. Stennis celebrates the culture, heritage, and diversity of native peoples throughout the month by hosting educational discussions and sharing ways to celebrate Native American culture.

First and foremost is acknowledging the original inhabitants of the location of Stennis Space Center. The site of Stennis has a rich Native American heritage. Several Native American artifacts were uncovered during the site's excavation and are in safekeeping with the Stennis History Office. According to "Way Station to Space: A History of the John C. Stennis Space Center," Native Americans were the first people to inhabit the lands along the Pearl River, as the natural resources along the river were a lure and a virtual paradise. Evidence indicates they settled in the area 4,000 years before the arrival of European explorers. The Acolapissas, a tribe of the Choctaws, lived on the Pearl River banks during the early 1600s. Then, in 1699, Pierre LeMoyne Sieur D'Iberville, a French-Canadian explorer, sailed up the river from the Gulf of Mexico. He discovered large oysters on its banks and optimistically christened it the "Pearl River."

Stennis connected with the Mississippi Band of Choctaw Indians by creating a NASA Educator Resources Center (ERC) at Choctaw (Mississippi) Central high School. In May 1995, Stennis signed a Space Act Agreement with the Mississippi Band of Choctaw Indians to establish a regional ERC at the school. The ERC provided the school with NASA-related videos, computer software, resource materials, and lesson plans. Some projects completed through the ERC included basic rocketry, working with the Global Learning and Observation to Benefit the Environment Program, and participating in the FIRST Robotics Competition. In addition, Stennis has an ongoing relationship with the Choctaw Tribal School in Choctaw, Mississippi, through the NASA ASTRO CAMP Collaborative Partner Program and NASA's Robotics Alliance Project.

In addition to the history of indigenous

communities at Stennis, the surrounding areas also have a rich history of native peoples. Cultural Survival, an indigenous-led, non-governmental organization and U.S. registered non-profit, suggests a few simple ways to learn more about the abundance of history and culture of native peoples, such as:

Learn about tribes in surrounding areas

The tribes surrounding Mississippi and Louisiana include Choctaw Nation of Oklahoma; Jena Band of Choctaw Indians, Louisiana; Mississippi Band of Choctaw Indians; and Quapaw Tribe of Indians, Oklahoma. To learn more about the tribes, visit online documents from the [Mississippi treaties](#) and the [Louisiana treaties](#) located in the National Archives. Additionally, to check out a global interactive map of tribe history, click [here](#).

Read the works of Native American authors

A great way to learn about Native American history and culture is to read a book by a Native American author. A few authors include Tommy Orange, Louise Erdrich, Stephen Graham Jones, and Joy Harjo. With a wide variety of genres - biographies, historical accounts, and fiction, to name a few - there is something for everybody. One can also read up on the history of Native Americans using resources provided by the [National Archives](#).

America is a vast land of many cultures dating back thousands of years to the land's original inhabitants. NAHM is a great time to learn more about the history, heritage, and culture of Native Americans, Alaska Natives, and Native Hawaiians.

To learn more, select the links below

[National Native American Heritage Month - Exhibits and Collections](#)

[Tribal Reservations | CDC](#)

[Mississippi Band of Choctaw Indians | NASA](#)

[History.nasa.gov/SP-4310/ch2.htm](https://history.nasa.gov/SP-4310/ch2.htm)

[Cultural Survival](#)



In the 1980s, the BioHome at NASA's Stennis Space Center was 45 feet long, 16 feet wide, and used common indoor house plants as living air purifiers.

Household Plants Researched as Air Filters in the 1980s

In the late 1980s, Stennis Space Center was part of groundbreaking research on indoor air pollution. Dr. Bill Wolverton, then a senior research scientist at Stennis, along with the Associated Landscape Contractors of America (ALCA) released the findings of a two-year study in 1989, called the NASA Air Study, that suggested common indoor houseplants may provide a natural way of combating indoor air pollution.

After preliminary evaluations of the use of common household plants for indoor air purification and revitalization, ALCA joined NASA in funding the study. About a dozen popular varieties of plants were studied to determine their effectiveness in removing several key pollutants associated with indoor air pollution.

Various plant types were placed in sealed, plexiglass chambers where chemicals were injected. Spider plant, philodendron, and the golden pothos were labeled as the most effective in removing formaldehyde. Flowering plants, such as the gerbera daisy and chrysanthemums, were rated superior in removing benzene from the

chamber atmosphere. Other plants demonstrated to be effective air purifiers included the bamboo palm, peace lily, mass cane, ficus, mother-in-laws tongue, English ivy, and Chinese evergreen.

In 1989, Wolverton said, "We feel that future results will provide an even stronger argument that common landscaping plants can be a very effective part of a system used to provide pollution-free homes and workplaces."

For years, while working at Stennis, Wolverton conducted research into the use of biological processes as a means of solving environmental problems on Earth and in space habitats. His research proved invaluable, as today NASA continues to study plants onboard the International Space Station through the Vegetable Production System, known as Veggie, and the Advanced Plant Habitat.

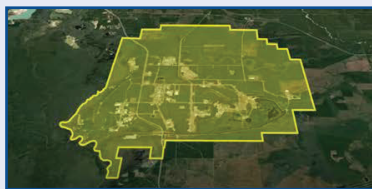
After his retirement in 1990, Wolverton went on to start his own environmental firm working in air and water quality and to publish many environmental papers and books. For more information, click [here](#).

Online Resources

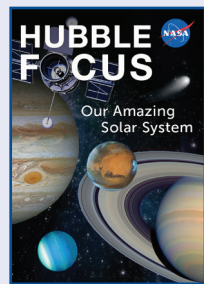
Stennis 60th Anniversary Coverage
WWL-TV WLOX

WJTV SUPERTALK

I Am Stennis Facebook Videos



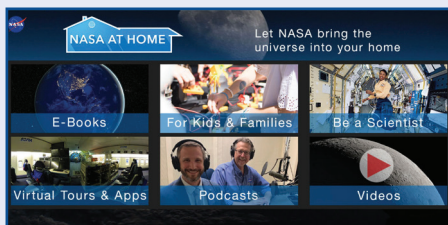
Stennis Virtual Tour



NASA E-Book Downloads



MARS 2020 STEM Toolkit



NASA at Home

Stennis Emergency Management

NASA Coronavirus Response

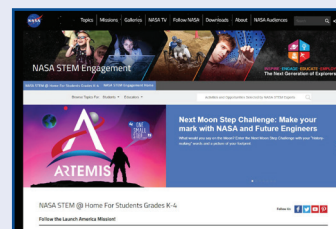
Stennis Fact Sheets



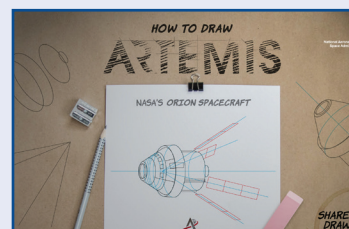
First Woman Graphic Novel



Stennis Artemis Resources page



NASA STEM@Home for Students



How to Draw Artemis