



National Aeronautics and Space Administration



# LAGNIAPPE

John C. Stennis Space Center

Volume 15 Issue 3

[www.nasa.gov/centers/stennis](http://www.nasa.gov/centers/stennis)

April 2019

# Forward to the Moon!



NASA conducts a test of RS-25 flight engine No. 2062 on April 4 on the A-1 Test Stand at Stennis Space Center near Bay St. Louis, Miss. The test marked a major milestone in NASA's march forward to the Moon missions. All 16 RS-25 engines that will help power the first four flights of NASA's new Space Launch System rocket now have been tested. **See page 3.**



A short trailer for the 2014 movie *Interstellar* speaks of singular moments of achievement by humans – “when we dared to aim higher, to break barriers, to reach for the stars, to make the unknown known.”

Those words came to mind – and rightly so – as I watched the test of RS-25 flight engine No. 2062 on the A-1 Test Stand early this month. What a moment!

We mark a lot of milestones in life, but the test on April 4 truly was a signature moment. With that hot fire, all of the engines that will launch the first four missions of NASA’s new Space Launch System rocket have been tested for flight worthiness. New controllers for the engines all have been tested now as well. The upgraded controllers work as the “brain” of the engine, monitoring its performance and helping it communicate with the rocket. I wonder if Old Gator could get a brain upgrade as well? Ark!

The test concluded more than four years of RS-25 engine testing here at Stennis. The main focus was to prove the engines were ready for flight and to demonstrate that their latest power and component upgrades would perform as needed.

NASA wanted to run the engines and new controllers through a variety of scenarios – and the Stennis team made each one happen. Now, as far as power goes, everything is ready to fly. Stennis has done its part.

Of course, there will be more testing on new engines to come – but we all should take a moment to appreciate the milestone we witnessed. Stennis tested the way for Apollo to fly in the 1960s and 1970s. It tested the way for the space shuttle to fly from 1981 to 2011. Now, it has tested the way for this nation’s grandest space adventure ever to aim higher and break new barriers and reach even farther toward the stars.

As Dr. Seuss might say – “There are worlds yet to see / And worlds yet to know / We have the power to fly / Oh, the places we’ll go.” Ark!

Actually, the *Interstellar* trailer may say it even better, reminding us not only that milestone moments are a cause for celebration but guideposts to follow to something even greater. “We are still pioneers, ...” the trailer voiceover concludes. “We’ve barely begun and ... our greatest accomplishments cannot be behind us because our destiny lies above us.”



*Lagniappe* is published monthly by the Office of Communications at NASA’s John C. Stennis Space Center.

Access monthly copies at: [www.nasa.gov/centers/stennis/news/publications/index.html](http://www.nasa.gov/centers/stennis/news/publications/index.html)

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# NASA achieves rocket engine test milestone needed for Moon missions

NASA is a step closer to returning astronauts to the Moon in the next five years following a successful engine test on April 4 at NASA's Stennis Space Center near Bay St. Louis, Mississippi. The latest "hot fire" was the culmination of four-plus years of testing for the RS-25 engines that will send the first four Space Launch System (SLS) rockets into space.

"This completes four years of focused work by an exceptional Stennis test team," Stennis Director Rick Gilbrech said. "It represents yet another chapter in Stennis' long history of testing leadership and excellence in support of this nation's space exploration efforts. Everyone involved should feel proud of their work and contributions."

NASA's April 4 hot fire on Stennis' A-1 Test Stand completed:

- Acceptance testing of all 16 former space shuttle main engines that will help launch the first four SLS missions. NASA has contracted with Aerojet Rocketdyne to build new RS-25 engines for additional SLS missions, and work already is underway to do so in the company's factory in Canoga Park, California.
- Developmental and flight-worthy testing for new controllers (plus one spare) to be used by the heritage RS-25 engines for the first four missions.
- A 51-month test series at Stennis that demonstrated RS-25 engines can perform at the higher power level needed to launch the super heavy-lift SLS rocket.

"Engines are now a 'go' for missions to send astronauts forward to the Moon to learn and prepare for missions to Mars," said Johnny Heflin, deputy manager of the SLS Liquid Engines Office at NASA's Marshall Space Flight Center in Huntsville, Alabama. "We're ready to provide the power to explore the Moon and beyond."

The RS-25 rocket engine test era began Jan. 9, 2015, with a 500-second – more than 8 minutes – hot fire of RS-25 developmental engine No. 0525 on the A-1 Test Stand. NASA tested the first SLS flight engine on March 10, 2016. Altogether, the agency has conducted 32 developmental and flight engine tests for a total of 14,754 seconds – more than four hours – of cumulative hot fire – all on the A-1 stand at Stennis.

Having launched 135 space shuttle missions, these main engines are considered the most tested in the world. When the Space Shuttle Program ended in 2011, NASA still had 16 engines that ultimately were modified for SLS.

These engines were originally designed to perform at a certain power level, known as 100 percent. Over time, the engines were upgraded to operate at higher and higher power levels, up to 104.5 percent operating power level by the end of the shuttle program. For SLS, that operating level has to be pushed even higher.

To help accomplish that, and to interface with new rocket avionics systems, NASA designed and tested a new engine controller, which serves as the "brain" of the engine to help monitor engine operation and facilitate communication between the engine and rocket. Early developmental testing at Stennis provided critical information for designing the new controller.

The first new flight engine controller was tested at Stennis in March 2017, with a string of controller hot fires to follow. The April 4 test marked the testing of the 17th engine controller for use on SLS flights, providing enough for all 16 heritage RS-25 engines.

With development of the new controllers, NASA had to test the new power level as well. First, it was demonstrated that the engine could perform at the needed 111 percent power level. Next, NASA needed to prove a margin of operating safety.

In February 2018, operators pushed the engine to 113 percent power for a total of 50 seconds. NASA lengthened that firing time in two subsequent tests at Stennis, until late this February, when the engine was fired at 113 percent power for

430 seconds of a 510-second test.

That set the stage for Thursday's successful test of flight engine No. 2062. When this specific engine fires again, it will help send astronauts aboard Orion around the Moon on a test flight known as Exploration Mission-2.

The president's direction from Space Policy Directive-1 galvanizes NASA to return to the Moon and builds on progress on the Space Launch System rocket and Orion spacecraft, efforts with commercial and international partners, and knowledge gained from current robotic presence at the Moon and Mars.

***This completes four years of focused work by an exceptional Stennis test team. It represents yet another chapter in Stennis' long history of testing leadership and excellence in support of this nation's space exploration efforts. Everyone involved should feel proud of their work and contributions.***

Stennis Director Rick Gilbrech



RS-25 flight engine No. 2062 is lifted onto the A-1 Test Stand at NASA's Stennis Space Center near Bay St. Louis, Miss. The Aerojet Rocketdyne-built engine was delivered to the stand March 20 and test fired April 4.

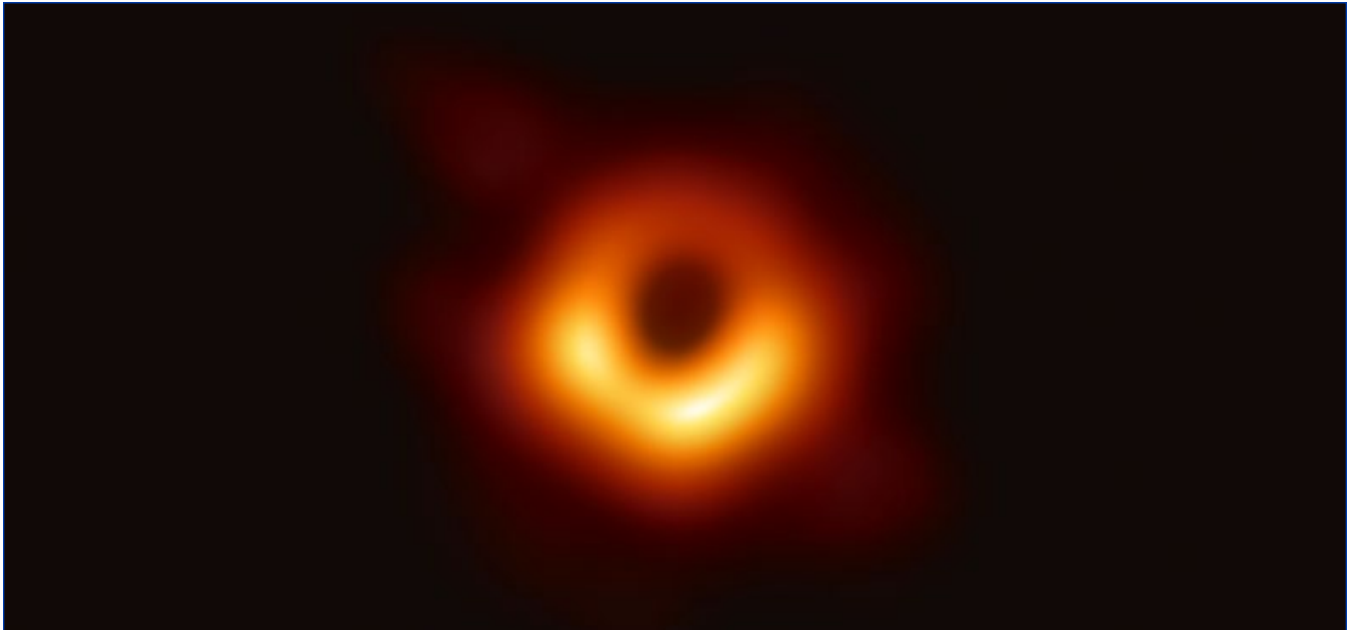


# Stennis Space Center hosts South Mississippi Area III Special Olympics



Stennis Space Center hosted annual South Mississippi Area III Special Olympics Field Games on March 23, with participants from a four-county area gathering for friendly competition in numerous summer sporting events. Athletes with special needs gathered for the event at INFINITY Science Center just outside of Stennis. The Special Olympics program is designed to provide year-round sports training and athletic competition for intellectually or developmentally challenged adults and children. The program seeks to help athletes gain confidence and build a positive self-image that carries over into the classroom, home, workplace and community. Patterned on the World Olympics, the games include an opening ceremony and a host of Olympic-type track and field competitions. All athletes receive ribbons for participating. Stennis Space Center has hosted the South Mississippi Area III Special Olympics Field Games since 1983. For more about Special Olympics, visit online at: <https://www.sscspecialolympics.com/>.





## Historic – black hole image captured for the 1st time

A black hole and its shadow have been captured in an image for the first time, a historic feat by an international network of radio telescopes called the Event Horizon Telescope (EHT). EHT is an international collaboration whose support in the U.S. includes the National Science Foundation. A black hole is an extremely dense object from which no light can escape. Anything that comes within a black hole's "event horizon," its point of no return, will be consumed, never to re-emerge, because of the black hole's unimaginably strong gravity. By its very nature, a black hole cannot be seen, but the hot disk of material that encircles it shines bright. Against a bright backdrop, such as this disk, a black hole appears to cast a shadow. The stunning new image shows the shadow of the supermassive black hole in the center of Messier 87 (M87), an elliptical galaxy some 55 million light-years from Earth. This black hole is 6.5 billion times the mass of the Sun. Catching its shadow involved eight ground-based radio telescopes around the globe, operating together as if they were one telescope the size of our entire planet. "This is an amazing accomplishment by the EHT team," said Paul Hertz, director of the astrophysics division at NASA Headquarters in Washington. "Years ago, we thought we would have to build a very large space telescope to image a black hole. By getting radio telescopes around the world to work in concert like one instrument, the EHT team achieved this, decades ahead of time." To complement the EHT findings, several NASA spacecraft were part of a large effort, coordinated to observe the black hole using different wavelengths of light.

## NASA in the News

### Bridenstine statement on return to Moon

The following is a statement from NASA Administrator Jim Bridenstine on the March 26 announcement by Vice President Mike Pence about putting American astronauts back on the Moon in the next five years: "NASA is charged to get American astronauts to the Moon in the next five years. We are tasked with landing on the Moon's South Pole by 2024. Stay on schedule for flying Exploration Mission-1 with Orion on the Space Launch System (SLS) rocket next year, and for sending the first crewed mission to the lunar vicinity by 2022. NASA will continue to 'use all means necessary' to ensure mission success in moving us forward to the Moon. It is the right time for this challenge, and I assured the vice president that we, the people of NASA, are up to the challenge. We will take action in the days and weeks ahead to accomplish these goals. We have laid out a clear plan for NASA's exploration campaign that cuts across three strategic areas: low-Earth orbit, the Moon, and Mars and deeper into space." To view Bridenstine's entire statement on the return to the Moon, visit: <https://go.usa.gov/xmCfs>.

### Spinoff highlights NASA technology

From precision GPS to batteries for one of the world's first commercial all-electric airplanes, NASA technology turns up in nearly every corner of modern life. The latest edition of NASA's *Spinoff* publication features dozens of commercial technologies that were developed or improved by the agency's space program and benefit people everywhere. The publication provides nearly 50 examples of how NASA benefits industries and people around the world. For example, fitness enthusiasts may be surprised to learn about NASA's contribution to the Bowflex Revolution resistance-exercise home gym. Other highlights include a crucial component of pacemakers, as well as reactors that use electricity "breathing" bacteria to clean wastewater and generate power at wineries and breweries. The publication also includes a "Spinoffs of Tomorrow" section that showcases 20 new NASA technologies available for license. For print/digital versions of *Spinoff*, visit: <https://go.usa.gov/xmCGa>. An iPad version is available for download in the iTunes store. For more about NASA technology transfer, visit: <https://technology.nasa.gov>.



## NASA honors employees for flight safety

Six Stennis Space Center and Michoud Assembly Facility employees received NASA Space Flight Awareness Honoree Awards during an April 3 ceremony in New Orleans. Astronaut Scott Tingle, along with Bill Hill, NASA deputy associate administrator for exploration systems development, presented the awards. In recognition of their flight program contributions, the honorees toured NASA's Michoud Assembly Facility in New Orleans and Stennis Space Center. They also had the opportunity to view a hot fire test of RS-25 flight engine No. 2062 on the A-1 Test Stand at Stennis. Honorees (their companies and NASA location) included (l to r): Mike Pannell (NASA, Stennis Space Center), Donovan Thomas (A<sup>2</sup>Research, Michoud Assembly Facility), Laura Pair (SaiTech, Stennis Space Center), Angelia Humphrey (Aerojet Rocketdyne, Stennis Space Center), Brock Saucier (Syncom Space Services, Stennis Space Center) and Marcus Gary (Aerojet Rocketdyne, Stennis Space Center). Neil Toupin (NASA, Stennis Space Center) also was honored but was unable to attend the ceremony. NASA's Space Flight Awareness Program recognizes outstanding job performances and contributions by civil service and contract employees and focuses on excellence in quality and safety in support of human spaceflight.

## Stennis hosts Women's History Month program

A trio of women present a panel discussion during a Women's History Month Program at Stennis Space Center on March 26. This year's program focused on the theme "Champions of Peace, Nonviolence and Innovation" and highlighted women whose courage and resolve have contributed to the character and success of the nation and world. Panel participants for the Stennis program included (l to r): Patty Kelly, Naval Meteorology and Oceanography Command at Stennis; Karen Vander, NASA Safety and Mission Assurance Directorate at Stennis; and Angelyn Treutel Zeringue, president of South Group Insurance in Bay St. Louis.





## Xavier group visits Stennis

Members of a LaSPACE (Louisiana Space Grant Consortium) group from Xavier University in New Orleans stand at the B-1/B-2 Test Stand during a site visit March 26. The students toured various Stennis facilities and learned about ongoing rocket engine test and science work at the site. LaSPACE is a member of a nationwide organization that partners NASA with colleges/universities and other space-related institutions to promote scientific research, workforce development, and public outreach to develop and strengthen longterm research capabilities that will make significant contributions to NASA research and technology. The program is funded by NASA and the Louisiana Board of Regents.



## Stennis hosts Mississippi high school education group

Stennis Space Center Deputy Director Randy Galloway speaks to students with a PACES (Parents and Community Equals Education) group from Kemper County High School in DeKalb, Miss., during a March 28 site visit. During the day, the group learned about ongoing work at Stennis and toured site facilities. Kemper PACES Project seeks to stimulate partnerships between the school district, community leaders, business leaders, parents and students. It has been cited by Mississippi State University as being a "Best Practices" model project.



## Hail & Farewell

NASA bids farewell to the following:

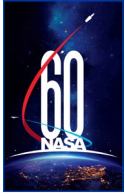
Christopher Moore  
LeAnn Olson  
Mark Warren

Equal Employment Specialist  
Contract Specialist  
Management and Program Analyst

Office of Diversity and Equal Employment  
Office of Procurement  
Office of the Chief Financial Officer



## 1973 – Space shuttle testing leads to full utilization



*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.*

In 1973, the then-Mississippi Test Facility (MTF) had a total of 1,127 employees. After the Apollo Program ended, work forces were cut as the facility faced tough times. However, an engine test project was on the horizon – the space shuttle. The space shuttle was designed as a reusable vehicle to carry humans to low-Earth orbit following the Apollo Program.

MTF jumped at the chance to test the engines that would power the shuttle fleet. An effort to have shuttle engines manufactured at Michoud Assembly Facility in nearby New Orleans and tested at MTF went into motion. One of the companies entering bids for the project was the Lockheed Propulsion Co. of California, which embraced the idea of using Michoud and MTF to perform the work. Other companies putting in bids for the work were Thiokol Chemical Corp. of Brigham City, Utah; Aerojet Solid Propulsion Co. of Sacramento, California; and United Technology Center of Sunnyvale, California.

With bids submitted, a delegation of elected officials, community leaders and business people from Louisiana and Mississippi began lobbying for the work to come to

their states. In late 1973, the award was given to Thiokol Chemical Co. The local community around Michoud and MTF were baffled by the announcement since just a few years earlier, MTF had been named “the nation’s foremost propulsion test site.”

The announcement set off a series of events that would shape the future of MTF: the protest of the solid rocket motor contract award to Thiokol; and calls for “full utilization of MTF” by U.S. Sen. John C. Stennis, U.S. Rep. Trent Lott and other Mississippi and Louisiana officials.

Sen. Stennis spearheaded the movement for full utilization, and on June 14, 1974, Mississippi Test Facility was renamed the National Space Technology Laboratories (NSTL) and became an independent installation of NASA, reporting to NASA headquarters. Stennis said the “efforts to increase the use of NSTL by NASA and other federal agencies (would) now be more successful than ever before.” Site Director Jackson Balch was quite pleased with the changes, saying that “it will be kind of nice to be a member of the club.”

Just a year later, on June 24, 1975, a brief, but very important event occurred at the newly independent site, the first ignition test of a space shuttle main engine. It lasted just a second but marked the return to propulsion testing for NSTL and opened the door for testing projects to follow, including the current testing of engines that eventually will carry humans further than ever.



Sunset offers a scenic view of a space shuttle main engine test on the A-2 Test Stand at Stennis Space Center on July 21, 2003. After an initial space shuttle main engine test in June 1975, Stennis continued testing of the engines for the next 34 years.



## Office of Diversity and Equal Opportunity

# Holocaust Days of Remembrance – stories of rescue

The U.S. Congress established the Days of Remembrance as our nation's annual commemoration of the victims of the Holocaust and created the United States Holocaust Memorial Museum (USHMM), as a permanent, living memorial to those victims.

According to the USHMM, the Holocaust was the systematic, bureaucratic, state-sponsored persecution and murder of 6 million Jews, as well as the millions of non-Jewish, by the Nazi regime and its collaborators. Holocaust is a word of Greek origin meaning "sacrifice by fire."

The stories of ordinary people who chose to intervene and help rescue Jews, despite the risks, demonstrate that individuals have the power to make a difference.

Below are a few stories that highlight rescuers whose decisions to act during the Holocaust provide inspiration to counter indifference with vigilance and apathy with action.

### **A Bishop – Greek Isle of Zakynthos, September 1943**

When German officials demanded a list of the island's Jewish residents, Mayor Karrer turned to local Greek Orthodox Bishop Chrysostomos for help. As the bishop negotiated for their lives, 192 Jews fled to remote local villages where non-Jewish locals hid them. When the Germans again demanded the names for deportation, Chrysostomos presented a list bearing only two names – his and the mayor's. "Here," he said, "are your Jews." At war's end, all 275 of Zakynthos's Jews were still alive.

### **A Social Worker – The Netherlands, 1942-45**

Having witnessed a brutal deportation at a Jewish children's home in Amsterdam in 1942, social worker Marion (van Binsbergen) Pritchard engaged in rescue work throughout the war. Among the more than 150 Jews she rescued were Freddie Polak and his children. She placed them in hiding in a house in the country, lived with them as the children's caregiver, and even shot and killed a Dutch policeman who discovered the children when he unexpectedly returned to the house following a raid.

### **A Businessman – Switzerland, 1938-39**

In 1938, Capt. Paul Grueninger, commander of the Swiss Border Police in St. Gallen Canton, chose to disregard orders to close the borders to most Jewish refugees. Not only did he turn a blind eye to fake visas, he also backdated entry visas to prevent the expulsion of recent Jewish refugees. He was terminated for defying orders and, after being convicted by a Swiss court for falsifying official documents, punished with a severe fine. Grueninger's ac-

tions saved between 2,000 and 4,000 Jews.

### **A Housewife and Her Daughter – Ukraine, 1941-44**

During the German occupation of Ukraine, Tatyana Kontsevich and her daughter, Ania, sheltered the family of Shimon Redlich. Shimon hid with his mother, aunt, and uncle in the attic and shed of the Kontsevich home in Raj. Ten-year-old Ania was in charge of bringing them food and water. At one point, when home alone, Ania dissuaded two German soldiers in search of straw from climbing into the attic, where they would have found the Redlich family.

### **A Businessman – Germany, 1938-43**

As manager of a confiscated Jewish textile factory in the Bedzin ghetto, Alfred Rossner produced goods for the German armed forces. To save the Jewish forced laborers working in his factory, he issued them work permits that exempted them from deportation. Rossner repeatedly warned Jews of impending deportations, even driving into the poorest parts of Bedzin to urge the inhabitants to ignore a summons that would lead to deportation. In 1944, the Gestapo arrested and executed Rossner for his actions.

### **A Student – Albania, 1943-44**

After Germany dismembered Yugoslavia and occupied Serbia in 1941, the Mandils, a Jewish family from Belgrade, escaped to Albania. There, Mosa Mandil opened a photography shop and hired Refik Veseli, a 16-year-old Albanian Muslim, as his apprentice. When the Mandils were threatened by deportation after Germany occupied Albania in September 1943, Veseli convinced his parents to hide the family in their home village, Krujë. The Mandil children posed as Muslims while their parents hid in the Veselis' barn until liberation.

### **A Soldier – Lithuania, 1941-42**

Drafted into the German army, Austrian-born Anton Schmid was stationed in Lithuania in the autumn of 1941. Appalled by the dreadful conditions of the Vilna ghetto and by German massacres of Jews, he used his access to resources to provide Jews with provisions, transport to safer areas and forged papers. He also provided transportation and intelligence to Jewish resistance organizations. Wehrmacht authorities arrested Schmid for treason in 1942. Convicted by a military court, he was executed on April 13, 1942.

Take a moment to reflect during this year's Holocaust Days of Remembrance and consider what can be learned from these acts of courage.

*Information in this article came from: ushmm.org.*





# Faces of Stennis

Each month, Lagniappe will feature an employee at Stennis Space Center whose work enables the center to fulfill its mission as the nation's largest rocket engine test center. This month's employee is highlighted on the following page.





## Kim Driebergen



As a child, Kim Driebergen's space memories were focused on the *Jetsons* cartoon world of flying cars, robot housekeepers and auto-cooked dinners. Now, when she visits her sister, who teaches a seventh-grade science class in North Carolina, she enjoys sharing the world of NASA with students. "It's great seeing them excited about space exploration and innovation," says Driebergen, a senior resource analyst for NASA's new Space Launch System (SLS) rocket and Rocket Propulsion Testing Office Level III business manager at Stennis. "It's really good when the students realize that you do not have to be a scientist or an engineer to work at NASA. They are excited to learn that NASA employees cross all career paths, and it's great when they can see themselves in a career at NASA." A resident of Van-cleave, Miss., Driebergen grew up in Lafayette, Ind., and

Seven Springs, N.C. She arrived at Stennis 15 years ago, working with the Naval Oceanographic Office. She joined NASA in 2008 as a resource analyst in the Projects Directorate, working with the AJ26 rocket engine test project, the A-3 Test Stand construction project and the Rocket Propulsion Testing Office. She also served as senior contract analyst in the Budget Integration Branch of the Stennis Office of the Chief Financial Officer before assuming her current position providing resource analyst support to the Stennis Engineering and Test Directorate. For Driebergen, the best things about working at Stennis are the people and being a part of something bigger than oneself. "I'm super excited for SLS and watching as we meet the challenges of going to the Moon in five years," she says. Away from work, Driebergen is a part-time rancher and very involved with veterans' charities.