



National Aeronautics and Space Administration



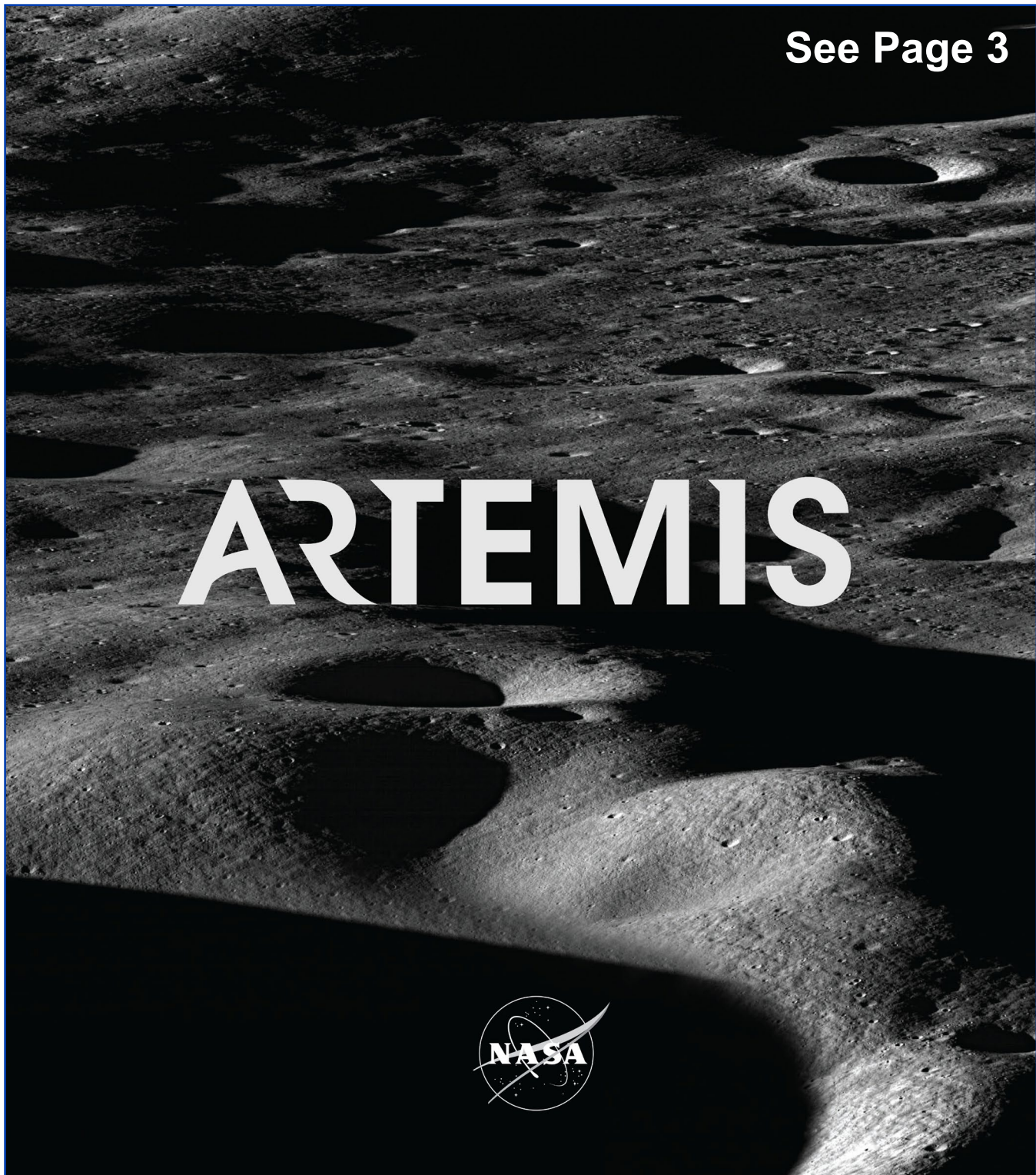
LAGNIAPPE

John C. Stennis Space Center

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ARTEMIS



If Thanksgiving is around the corner, it means my friend Theopolis Turkey and I are spending evenings on the banks of the Pearl River, catching up on our lives and waxing a bit philosophical on occasion. Theo always wanders over my way this time of year to enjoy a stress-free season, and our conversations also seem to turn reflective sooner or later. Maybe it is because we have been friends for so long that we are like two bodies with one soul. Then, again, it could be our secret recipe eggnog. Ark!

One evening, I was telling Theo about a favorite book that features a character who decides to use his millions to help others, especially forgotten folk. “I’m going to be an artist,” the character explains. “I’m going to love (people). ... That is going to be my work of art.”

Theo said that reminded him of a favorite quotation, though the eggnog had robbed his memory of the source and exact words. “Whoever it was talks about how every time two people meet, there is an opportunity,” Theo said. “They can either build one another up or tear one another down, either be glad they met or sorry they ever laid eyes on one another. The writer calls it a chance at holiness.”

The words brought to mind all the people I meet during a given day, some of them friends or familiar to me, others random individuals. Some encounters leave me feeling good about the day, even if it is just through a friendly word or an exchange of smiles on the sidewalk or in the hallway. Some leave me feeling not so good.

“It is so simple,” I said. “I wonder why more people do not understand how important it is just to be nice.”

“Well,” Theo said, “do you always remember that?”

Ouch – that hit home. How many times each day do I not pay attention to how I am interacting with someone? Every year at this time, I give thanks for the many kind, gracious people in my life. Theo made me wonder if they can they be just as thankful for my presence in theirs? I need to live in a way that ensures they can.

“Touche, Theo, you got me,” I said, before adding in a teasing tone. “And just for that, you can get up and get your own eggnog the next time your glass is empty.”

“Now, now, Gator,” Theo responded in his own light manner. “You just blew your chance at holiness.”



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NASA's MOON to MARS MISSION

GO...
GO...
GO!

What is NASA's Artemis Program?

One day in the sooner-rather-than-later future, people across the nation will rearrange daily schedules to witness a long-anticipated event – the maiden launch of NASA's new Space Launch System (SLS) rocket.

A pair of solid rocket boosters and four RS-25 engines will fire at a south Florida launchpad to generate more than 8 million pounds of thrust, lifting the 321-foot SLS rocket into the sky on its way to the Moon and back.

The launch will herald the beginning of a new great era of space exploration, one set on establishing a sustainable presence on the Moon and placing human footprints on Mars.

In no small part, success of the new era rests on hard work provided by Stennis Space Center, which is testing the rocket engines and SLS core stage that will power the new rocket to unprecedented destinations.

Lagniappe is featuring a series of articles under the "Go ... Go ... Go!" heading that detail aspects of NASA's next step into deep space and Stennis' role in making such missions possible. The following represents the second installment.

In December 1972, humans flew the final Apollo 17 mission to the Moon. As astronaut Gene Cernan prepared to step off of the lunar surface for the last scheduled visit, he offered a final comment. "As I take man's last step from the surface, back home for some time to come, but we believe not too long into the future, I'd like to just (say) what I believe history will record – that America's challenge of today has forged man's destiny of tomorrow," Cernan said.

It may have been longer in coming than expected, but the future that Cernan and others envisioned 57 years ago is at hand. In the next five years, NASA's Artemis missions will return humans to the Moon.

What is Artemis?

NASA has established the Artemis Program to land American astronauts, including the first woman and the next man, on the Moon by 2024. The program will use new innovative technologies and systems to explore more of the Moon than ever. Through Artemis, the agency will work with commercial and international partners to establish sustainable missions

to the Moon by 2028. It also will develop and test systems and technologies needed to take the next giant leap – sending astronauts to Mars.

Why Artemis?

"Artemis" is the perfect name for the program. Humans first traveled to the Moon through NASA's Apollo Program. In Greek mythology, Artemis is the twin sister of Apollo and goddess of the Moon. She now personifies human's return to the lunar surface, including new locations like the Moon's South Pole.

Why return to the Moon?

NASA has set specific goals for returning to the lunar surface. Artemis missions will:

- Prepare for future exploration missions deeper into space – including Mars – by developing and proving new technologies and capabilities and by learning how to live and operate on the surface of another celestial body just three days from home.
- Find and use water and other critical resources needed for longterm exploration.
- Investigate the Moon's mysteries and learn more about Earth and the universe.
- Establish American leadership and a strategic presence on the Moon while expanding the U.S. global economic impact.
- Broaden commercial and international partnerships and develop new business approaches needed for future missions.
- Inspire a new generation and encourage young people to pursue careers in STEM (science, technology, engineering and mathematics).

How will astronauts get there?

NASA's powerful new rocket, the Space Launch System (SLS), will send astronauts aboard the Orion spacecraft a quarter million miles from Earth to lunar orbit. Astronauts will dock Orion at the Gateway, a small spaceship orbiting the Moon. Astronauts will live and work aboard the Gateway during their missions. The crew will take expeditions from the Gateway to the surface of the Moon in a new human landing system before returning to the orbital outpost. Crew will ultimately return to Earth aboard Orion.

How long will it be before the first lunar mission?

Ahead of the human return to the surface of the Moon, NASA also will send a suite of science instruments and technology demonstrations to the lunar surface through commercial missions. NASA also will fly Artemis test missions. The agency is working to launch Artemis I in 2020, an uncrewed flight to test SLS and Orion together. Artemis II, the first SLS and Orion flight with crew, is targeted for 2022. NASA will land astronauts on the Moon by 2024 on the Artemis III mission and about once a year thereafter.

Is Stennis playing a role in the Artemis Program?

Yes! At launch, the SLS core stage will be powered by four RS-25 engines and a pair of solid rocket boosters. Stennis has been assigned to test all RS-25 engines that will be used on SLS missions. The site began RS-25 testing in January 2015. Earlier this year, it completed 32 developmental and flight engine tests for the initial four Artemis missions. It will begin testing new RS-25 engines in mid-2020. Stennis also will test the SLS core stage that will fly on the Artemis I mission. The so-called Green Run testing on the B-2 Test Stand will be the first time all SLS core stage systems will be tested and operated together, as during an actual mission. This will include firing all four of the stage's RS-25 engines just as during a mission launch.

Is Stennis prepared for its role?

Yes! Ever since the United States sought to travel beyond this planet, it has turned to Stennis to help power those space dreams. Stennis tested Saturn V rocket stages that carried humans to the Moon during the Apollo Program. It also tested the propulsion system and every engine that powered 135 space shuttle missions, including those that helped build the International Space Station and launch the Hubble Space Telescope. In the Apollo years, it was said the nation would have to go through south Mississippi to get to the Moon. More than 50 years later, the itinerary has not changed – Stennis remains the nation's way station for human deep space exploration.

Where can I learn more?

Learn more about NASA's Artemis Program online at: <https://www.nasa.gov/specials/artemis/>.

NASA's MOON to MARS MISSION

How the International Space Station is helping astronauts return to the Moon

The International Space Station (ISS) is a stepping stone for NASA's Artemis Program that will land the first woman and next man on the Moon by 2024. As the only place for conducting long-duration research on how living in microgravity affects living organisms, especially humans, as well as testing technologies to allow humans to work at the Moon, the space station serves as a unique asset in the effort to establish a sustainable presence at the Moon.

Missions to the Moon will include a combination of time aboard the Gateway lunar orbiting spaceship, on the lunar surface and in multiple spacecraft, including Orion and the human landing system. The skills and technologies developed to explore the Moon will help build the capabilities needed for future missions to Mars. Here are some of the ways ISS is contributing to the path forward to the Moon and Mars.

The human element

Keeping crew members safe in space is a top priority of lunar missions, and it requires a broad understanding of how living in microgravity affects humans. The space station has offered close to two decades of human research opportunities in a way that no other platform has been able to accomplish. Here is some of what is being learned:

- *Bone and muscle loss.* In weightlessness, bones and muscles have less to do, and astronauts experience bone and muscle loss during extended stays in space. Researchers continue to investigate the underlying mechanisms and contributing factors of this loss. They also have used the space station to understand how to use diet and exercise to counteract some of the negative effects of life in microgravity.
- *Vision.* One of the most valuable tools an astronaut will have for gathering information during a Moon mission will be his or her own eyes. Long-duration spaceflight, though, often causes changes to a crew member's vision. Scientists monitor spaceflight-induced visual impairment, as well as changes believed to arise from elevated pressure in the head, to characterize how living in microgravity affects the visual, vascular and central nervous systems. These studies could develop measures to help prevent lasting changes in vision and eye damage.
- *Health monitoring.* Missions to the Moon will prepare astronauts for missions to Mars, which will require greater self-sufficiency and independence from Earth, including monitoring health and wellness so that crew members can recognize and avoid risky health conditions on their own. The ISS allows NASA to test systems, such as a personal

carbon dioxide monitoring units, and to conduct research on ways to keep astronauts healthy.

- *Physical and mental function.* Exposure to space flight changes body systems in ways that could make it harder for crew members to perform critical mission tasks immediately



NASA astronaut Serena Auñón-Chancellor conducts an eye exam aboard the International Space Station, part of ongoing crew health maintenance activities.

after landing on a planetary surface. Crews traveling to the Moon or Mars will have little time to recover from these changes upon arrival and will lack access to Earth's medical and rehabilitation facilities. Several ISS studies have focused on the issue as a means of developing countermeasures, improving recovery time and preventing injury.

Technologies to support missions to – and on – the Moon

In order to travel through space or set up sustainable bases on the Moon or other planetary bodies, crew members need technology and hardware that provide basic human needs, includ-

ing oxygen and water, along with the ability to maintain and repair those systems. They also require the tools to conduct mission operations, such as:

- *Life support systems.* The space station has provided the impetus for development of state-of-the-art life support

to improve hygiene, crew comfort and sustainability.

- *Fire safety.* Understanding how fire spreads and behaves in space is crucial for the safety of astronauts, especially as humans travel farther from Earth. The ISS has enabled a wide range of combustion and flame experiments. One major discovery resulting from this research came from an analysis of fire suppressants: researchers identified the existence of “cool flames” that apparently continue “burning” after flame extinction under certain conditions.
- *Operations in space.* Astronauts have tested and used three-dimensional (3D) printers on the space station, advancing the ability to manufacture parts on-demand either aboard a spacecraft or on the surface of the Moon or Mars. Such manufacturing could even use recycled waste plastic materials to reduce the mass and number of tools or spare parts a crew would need to bring from Earth. Thanks to other research, astronauts can now perform DNA sequencing in space. This technology makes it possible to identify microbes and diagnose diseases to help maintain crew member health, as well as to potentially detect DNA-based life in the solar system. ISS research also has tested navigation techniques that use the Moon and stars. These techniques could serve as an emergency backup or confirm navigation information on future missions.

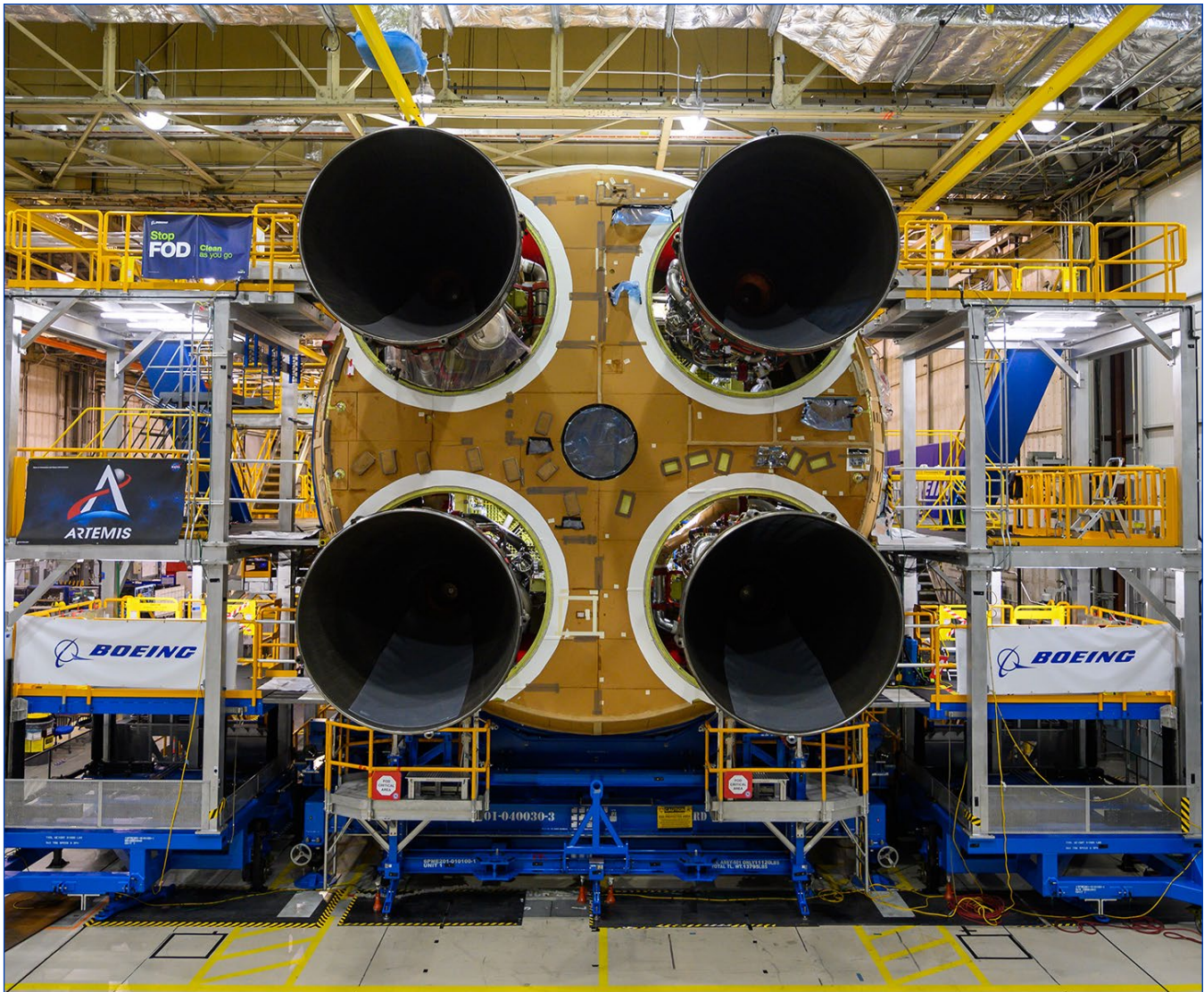
Large-scale international and commercial partnerships

The International Space Station represents the most politically complex space exploration program ever undertaken, involving the space agencies of the United States, Russia, Europe, Japan and Canada. It brings together international flight crews; multiple launch vehicles; launch, operations, training, engineering, communications and development facilities around the globe; and the international scientific research community.

In addition, space station research has evolved from relying almost solely on government funding and operations to involving a variety of commercial players. This commercialization drives future growth and innovation.

The space station's international and commercial partnerships provide valuable experience for achieving human presence on the Moon by 2024, part of the Artemis Program. This larger, sustainable exploration campaign with international and commercial partners is helping to unify nations, create new economic opportunities and inspire future generations.

For more information about NASA's Moon to Mars plans, visit: <https://www.nasa.gov/specials/moon2mars/>.

NASA's MOON to MARS MISSION

And 4 to go!

RS-25 engines attached for SLS Artemis I mission; rocket core stage headed to Stennis in December

All four RS-25 engines were structurally mated to the core stage for NASA's Space Launch System (SLS) rocket for Artemis I, the first mission of SLS and NASA's Orion spacecraft. To complete assembly of the rocket stage, engineers and technicians are now integrating the propulsion and electrical systems within the structure. The completed core stage with all four RS-25 engines attached is the largest rocket stage NASA has built since the Saturn V stages for the Apollo Program that first sent Americans to the Moon. The stage, which includes two huge propellant tanks, provides more than 2 million pounds of thrust to send Artemis I to the Moon. Engineers and technicians at NASA's Michoud Assembly Facility in New Orleans attached the fourth RS-25 engine to the rocket stage Nov. 6, just one day after structurally mating the third engine. The first two RS-25 engines were structurally mated to the stage in October. After assembly is complete, crews will conduct an integrated functional test of flight computers, avionics and electrical systems that run throughout the 212-foot-tall core stage in preparation for its completion later this year. This testing is the first time all the flight avionics systems will be tested together to ensure the systems communicate with each other and will perform properly to control the rocket's flight. Integration of the RS-25 engines to the massive core stage is a collaborative, multi-step process for NASA and its partners Boeing, the core stage lead contractor, and Aerojet Rocketdyne, the RS-25 engines lead contractor.

Stennis tests advanced preburner for U.S. Air Force

The Air Force Research Laboratory has successfully tested a state-of-the-art rocket engine preburner to elevate the U.S. technology base for high-performance oxygen-rich staged combustion.

The preburner was designed, developed and tested under the AFRL Hydrocarbon Boost (HCB) Program with prime contractor Aerojet Rocketdyne and supported by the Air Force Space and Missile Systems Center. Testing was conducted at NASA Stennis Space Center facilities, using the E-1 Test Stand.

The HCB preburner success was a culmination of two decades of AFRL research into oxygen-rich staged combustion to advance high-performance, robust and reusable domestic rocket engine technologies.

The preburner harnesses energy to power other engine systems and is subject to extreme oxygen environments that conventional metals cannot survive. The HCB preburner is the highest pressure rocket combustor ever tested in the U.S.

“The HCB preburner pushed the boundaries of these extreme conditions and redefined state-of-the-art for these challenging systems,” said Shawn Phillips, AFRL Aero-

space Systems Directorate chief of rocket propulsion.

AFRL used advanced technologies, such as super-nickel alloys for high-strength and burn resistance. Leveraging lessons from the HCB subscale preburner test campaign was key to achieving this successful test.

The HCB test article was highly instrumented to understand the technology trade space, rather than the development of a point design for operational use. This approach allowed AFRL researchers to study fundamental technical issues hindering engine development efforts today, such as combustion stability and thermal management.

Air Force ownership of the HCB preburner design, hardware and test data enables this foundational knowledge base to be directly applied to new engine design tools, academic research and transitioned across U.S. industry for future engine development efforts or block upgrades.

AFRL’s Rocket Propulsion Division at Edwards Air Force Base, California, has played a key role in advancing rocket engine technologies for the nation, since 1952. Nearly every liquid rocket engine developed in the United States traces its roots to AFRL technologies and experimental demonstrations.



The Air Force Research Laboratory successfully tested a state-of-the-art rocket engine preburner on the E-1 Test Stand at Stennis to elevate the U.S. technology base for high performance oxygen-rich staged combustion, developed by Aerojet Rocketdyne. Testing at Stennis concluded Sept. 30.



NASA posts woman on the moon images for Artemis

Artemis, the twin sister of Apollo and goddess of the Moon and the hunt, encompasses all of NASA's present efforts to return humans to the Moon – to prepare for and propel missions on to Mars. The Artemis Program will see the first woman and next man walk on the Moon. As the "torch bringer," literally and figuratively, Artemis will light the way for eventual travel to Mars. In a new image released by NASA, the portrait of the Greek goddess Artemis is illustrated in the highlights and shadows of the crescent Moon topography. Her features are abstract enough that any woman can see themselves in her. To download mobile and desktop backgrounds of the image in various colors, visit online at: <https://go.usa.gov/xpTPY>.


NASA in the News

New NASA software catalog released

Every space mission requires advanced software. With a variety of technical applications, NASA software can also benefit users outside the agency. NASA has released its 2019-2020 software catalog, which contains more codes than ever. Available in print and online, the fourth edition of the publication features hundreds of new software packages free to the public, without any royalty or copyright fees. The latest edition of the catalog contains 976 software packages, including business systems and project management, design and integration tools, data and image processing, data server processing and handling, environmental science, and more. NASA's Technology Transfer program also updated the process for downloading software to make it easier and faster. Interested users can initiate a software request with a click of the button and, in many cases, download code within minutes. NASA is offering its software free of charge. Access restrictions apply to some software that may be limited for use by U.S. citizens or for U.S. government purposes only. Print and digital versions of NASA's 2019-2020 software catalog are available at: <http://software.nasa.gov>.

NASA opens untouched Moon sample

NASA scientists have opened an untouched rock and soil sample from the Moon returned to Earth on Apollo 17, marking the first time in more than 40 years a pristine sample of rock and regolith from the Apollo era has been opened. It sets the stage for scientists to practice techniques to study future samples collected on Artemis missions that will return humans to the Moon. The sample, opened Nov. 5, was collected by Apollo 17 astronauts and was opened as part of NASA's Apollo Next-Generation Sample Analysis initiative, using new tools and technologies that were not available when the samples were originally returned to Earth. Since the Apollo era, all samples returned to Earth have been carefully stored in the laboratory to preserve them for future generations. Most samples have been well studied, and many are the subject of ongoing research. However, NASA also made the decision to keep some samples completely untouched as an investment in the future, allowing them to be analyzed with advanced technologies as they are developed. These include samples that remained sealed in their original containers, as well as some stored under special conditions.



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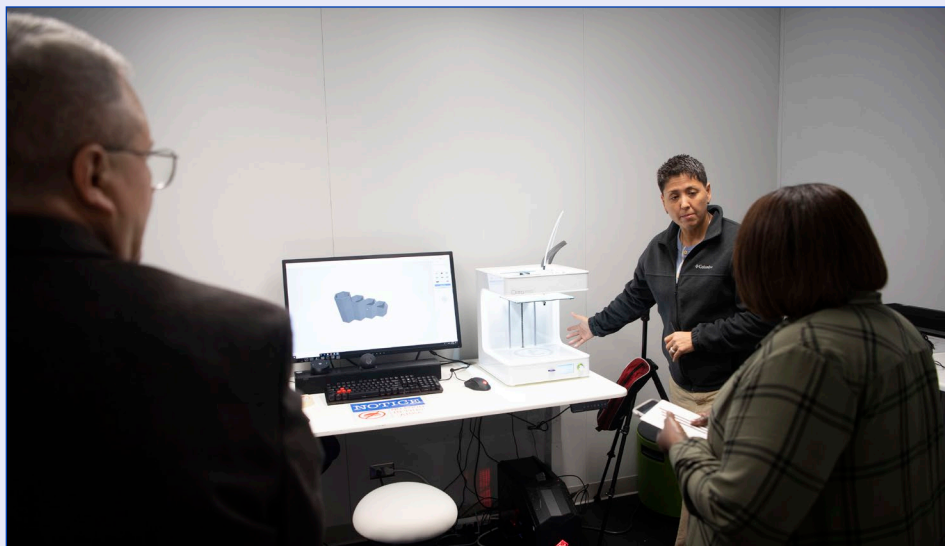
Receive a monthly email notice that the latest *Lagniappe* issue
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rocket propulsion test center.

A world of news awaits you!

Credit: NASA/ESA Hubble Space Telescope image

Stennis dedicates HIVE area

**Highly
Innovative
Versatile
Environment**



Stennis Space Center leaders cut the ribbon on a new onsite HIVE (Highly Innovative Versatile Environment) work space on Oct. 16, opening the area to individuals and groups working on team projects. The HIVE is set up in a non-traditional manner and features cutting-edge technologies to provide a more relaxed work area focused on creative collaboration. Participants in the ribbon cutting (center photo, r to l) were: Stennis Director Rick Gilbrech, Stennis Chief Technology Officer for Information Technology Chris Carmichael, Stennis Chief Information Officer Dinna Cottrell and Stennis Associate Director John Bailey.

NASA honors employees for flight safety

Three Stennis Space Center employees received NASA Space Flight Awareness Honoree Awards during a Nov. 6 ceremony in Houston. Astronaut Jim Kelly (far right), along with Sam Scimemi, International Space Station director at NASA Headquarters within the Human Exploration and Operations Mission Directorate, presented the awards. In recognition of their flight program contributions, the honorees toured NASA's Johnson Space Center in Houston and viewed testing for the Orion crew launch vehicle's manual uprighting pneumatic system. Honorees (and their companies) included (l to r): Joe Diggs (Syncom Space Services), Jim Mirandy (Bastion Technologies) and Mike Beech (Aerojet Rocketdyne). 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 fair highlights CFC

Missy Ferguson with NASA (top photo, l) and Maury Vander with NASA (bottom photo, r) talk to service organization representatives during a Stennis Combined Federal Campaign (CFC) Charity Fair on Nov. 7. During the onsite fair, employees were able to gather information from area organizations about services supported by CFC gifts. CFC is the largest annual workplace charity effort in the nation, with campaigns throughout the country and overseas raising millions of dollars for organizations that provide health and human service benefits throughout the world.



Employee excited about work – and family – at Stennis

Huy Nguyen grew up in a Vietnamese community known as Versailles in New Orleans East, in the figurative shadow of nearby Michoud Assembly Facility, the NASA site that was manufacturing space shuttle external fuel tanks at the time.

Nguyen's father worked at Michoud, so it was no surprise when he phoned home one afternoon just as his son arrived from school and told him to turn the television to a particular channel.

Doing so, Nguyen watched a space shuttle launch skyward on its low-Earth orbit mission. "I already loved airplanes, but to see something fly with flames spitting out the back of it was the best," Nguyen said.

From that point on, Nguyen was fascinated with spaceflight, assembling model rockets and collecting pamphlets about the space shuttle and International Space Station. The interest in

space and space travel never has waned, which is what lends such significance to Jan. 16, 2018, the day the transplanted Slidell resident began work as an electrical design engineer at NASA's Stennis Space Center. Nguyen originally worked for Syncom Space Services, but he has since joined the NASA team.

Nguyen arrived at Stennis with prior experience in upgrading and modifying engineering control systems on offshore rigs, skills that serve him well in his current work as the test complex support facility electrical engineer. In that role, Nguyen is working to redesign and upgrade the control systems for three test complex areas – cryogenic operations, the high-pressure industrial water plant and the high-pressure gas facility.

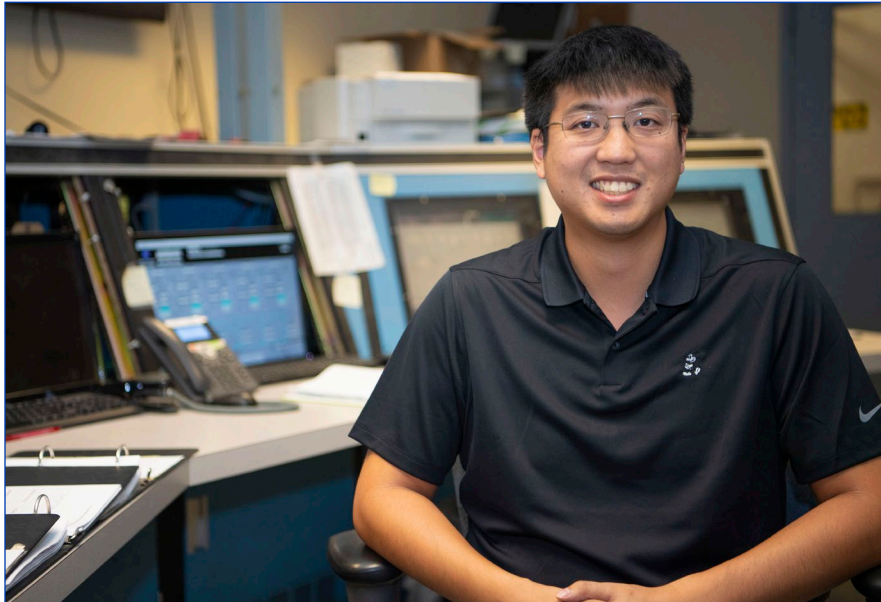
"I am tasked to help keep these areas operational since the entire test complex depends on the resources for maintenance and engine testing needs," Nguyen explained. In the case of the gas facility, that means ensuring it operates on a yearround basis, 24/7.

In all three instances, it means maintaining and upgrading systems that began operating more than 50 years ago.

The work has a direct impact on NASA's efforts to return humans to the Moon as part of the new Artemis Program. Stennis is testing rocket engines and stages for NASA's Space Launch System (SLS) rocket to fly those missions, including the one that will send the first woman and the next man to the Moon by 2024.

Nguyen particularly is focused on ensuring smooth operations for testing of the SLS core stage next year on the

B-2 Test Stand. "The test has some fairly high requirements," he said. "That means all of the systems that normally support the test stands will have to be doubled. A lot of the ground-work is being put into place now to do just that. I'm just trying to play my role in that effort to the best of my ability."



For Huy Nguyen, Stennis Space Center means energizing work as the test complex support facility electrical engineer and being a member of diverse, caring "family."

High-pressure gas facility systems already

have been largely upgraded, an effort that earned a NASA group achievement award for Nguyen and other upgrade team members. Nguyen's offshore experience with a similar system served him well during that project.

Nguyen is energized by the work. "Being able to work on something so grand and knowing that the work is going towards an even larger goal – Mars – is what really excites me," he said.

He also is amazed at the diversity of the Stennis work force. "There are so many different types of people here who bring a lot to the table," he said. "The diverse culture allows ideas to flow fluidly to create better products or designs."

However, the best thing about working at Stennis is the support from fellow employees, Nguyen said. "People care about you, care about your health and care about life outside of the workplace," he said. "There is a sense of camaraderie that's more akin to that of a family."



Stennis Space Center site visitors



Various individuals and groups visited Stennis Space Center in recent weeks to tour facilities and learn more about the nation's largest rocket propulsion test center.

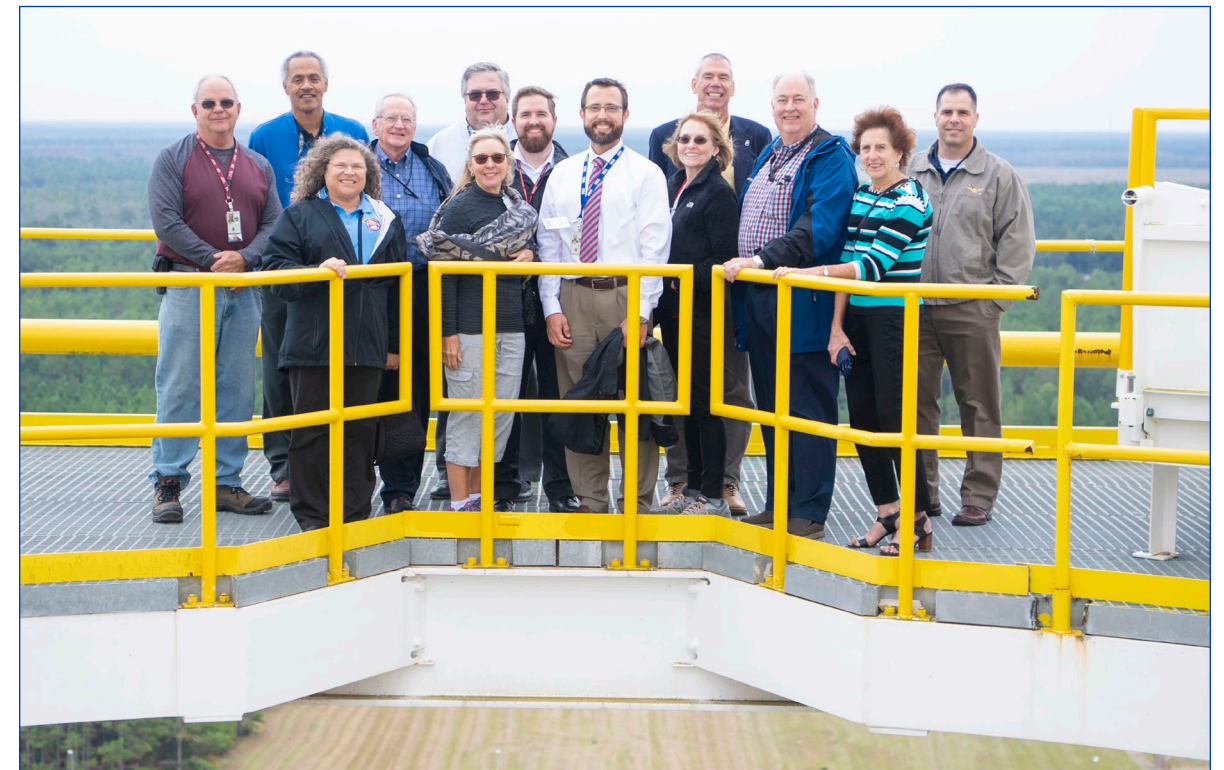
(Top left photo) Members of NASA's Rocket Propulsion Test Program Office visited Stennis on Oct. 22, participating in a windshield tour of the site that included a briefing at the B-1/B-2 Test Stand.

(Top center photo) NASA Office of Chief Technologist representatives from across the agency visited Stennis on Oct. 16 as part of an innovation road tour. Participants attended sessions and team breakouts focused on enabling and enhancing innovation across NASA.

(Top right photo) NASA demolition project managers from several centers visited Stennis on Oct. 23, touring site facilities, including the B-1/B-2 Test Stand. The managers also were briefed on construction and demolition work at Stennis.

(Bottom left photo) U.S. Rep. Kendra Horn of Oklahoma visited Stennis on Nov. 1, meeting with center leaders and touring facilities, including the B-2 Test Stand. Horn chairs the U.S. House Subcommittee on Space and Aeronautics.

(Bottom right photo) Members of the NASA Advisory Council's Human Exploration and Operations Committee visited Stennis Space Center on Oct. 17-18 for meetings and overview sessions. Participants also had an opportunity to tour the B-2 Test Stand.



Stennis employees participate in activities to highlight diversity, Artemis, cybersecurity

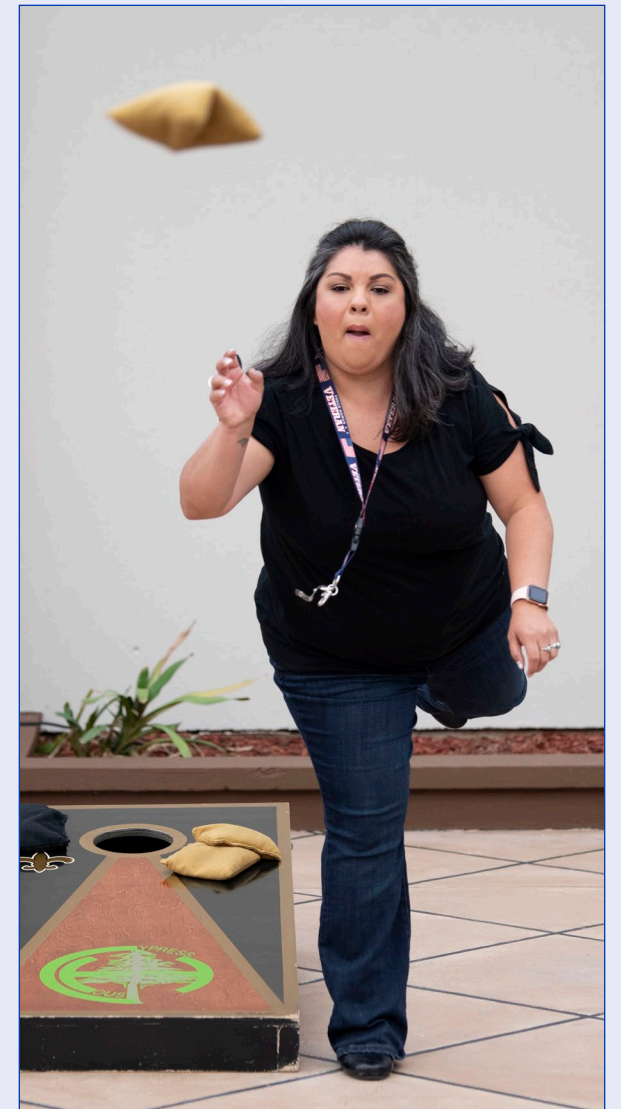


Stennis Space Center employees participated in several activities in recent weeks, highlighting key emphases.

(Left photos) A Diversity Awareness Program on Oct. 22 featured guest speaker Dwight Owens, who was paralyzed from the waist down in a 2005 car accident. Hosted by the Stennis Office of Diversity and Equal Opportunity, the theme of this year's program was "Don't Set Limits on Unlimited Potential" in celebration of the value and contributions of workers with disabilities. In his remarks, Owens emphasized individuals with disabilities have the power to overcome their circumstances. He urged program participants to realize and remember "there is no 'dis' in ability." Owens was presented a certificate of appreciation for his presentation by (bottom left photo, l to r) Juan Rodriguez, special emphasis program manager for individuals with disabilities for Stennis and the NASA Shared Services Center (NSSC); Michael Sweigart, director of the NSSC Support Operations Directorate; and Katrina Emery, Stennis diversity and equal opportunity manager.

(Top right photos) A cornhole competition between Stennis and NASA Shared Services Center (NSSC) on Oct. 23 highlighted National Cybersecurity Awareness Month. Competitors included Tom Gutierrez (Stennis) and Venetia Gonzales (NSSC).

(Bottom right photos) A NASA tailgate and jambalaya cookoff highlighted Stennis' preparation for "Green Run" testing of the Space Launch System core stage in 2020.





Stennis employees enjoy Family Day activities

Stennis Space Center employees and family members participated in annual Family Day activities at INFINITY Science Center on Nov. 2. Family Day participants were able to visit various INFINITY exhibits and enjoy hands-on activities sponsored by Stennis resident agencies. Family Day activities also featured a visit by astronaut Snoopy.



1972 – Second lunar mission records ‘firsts’



Note: NASA's John C. Stennis Space Center has played a pivotal role in the nation's space program. The following offers a glimpse into the history of the space program and the rocket engine test center.

biological isolation garments during recovery. However, they would still be required to be in quarantine for three weeks. Quarantine would be required through the Apollo 14 mission.

The Apollo 12 mission, the second mission to land on the Moon, launched 50 years ago on November 14.

However, the second sometimes comes with its own firsts, and that was the case with Apollo 12.

For instance, the crew brought with them a color TV camera to get higher quality images of the lunar surface. Unfortunately, lunar module pilot Alan Bean pointed the camera at the sun, and the camera ceased to work after that.

Another first was that, after careful review of the lunar samples brought back by the Apollo 11 mission, NASA scientists had determined there was no evidence of lunar microorganisms hitching a ride back to Earth. So, Apollo 12 astronauts, upon their return, would not have to wear the

Launch for Apollo 12 happened on a rainy day in November 1969 at Cape Canaveral. Telemetry contact was lost twice, at 36 seconds and at 52 seconds, when the Saturn V vehicle was struck by lightning. The booster's first stage engines continued to fire, however, and the electrical circuits and the lunar module were checked out with no significant problems noted.

Apollo 12 reached the Moon and landed successfully within walking distance of Surveyor 3 (an unmanned lunar probe launched in 1967). Pieces were removed to be taken back to Earth for analysis.

The return trip was uneventful, and Apollo 12 splashed down in the Pacific Ocean within three miles of the target area and within sight of the recovery ship, USS Hornet. The total flight time was 244 hours, 36 minutes, 25 seconds, just 62 seconds longer than planned.



Crew of the Apollo 12 lunar mission stand in front of a mock lunar module. Crew members are (l to r): Commander Charles "Pete" Conrad Jr., command module pilot Richard F. Gordon Jr. and lunar module pilot Alan L. Bean.

Hail & Farewell

NASA welcomes the following:

Ian Walters

Samone Wilson

Data Analysis

Public Affairs Specialist

Center Operations Directorate

Office of Communications

NASA bids farewell to the following:

Kamwren Nichols

Nathan Sovik

Contract Specialist

AST, Technical Management

Office of Procurement

Engineering and Test Directorate

Office of Diversity and Equal Opportunity

Reflect on contributions of Native Americans

During World Wars I and II, the U.S. military needed to encrypt communications against enemy intelligence. American Indians had their own languages and dialects that few outside their tribes understood; therefore, their languages were ideal encryption mechanisms.

Over the course of both wars, the U.S. Army and the Marine Corps recruited hundreds of American Indians to become code talkers. Records at the National Archives document the origins of this program and the group's wartime contributions.

Stationed in France in 1918, during World War I, Choctaw Indians from the 142nd Infantry Regiment, 36th Division, became the first code talkers. At the time, the enemy frequently intercepted Allied communications, inhibiting tactical plans and troop movements.

Leaders of the 142nd turned to American Indian soldiers in the regiment for help. They selected two Choctaw officers to supervise a communications system staffed by 18 other tribal members. This team began transmitting battle messages in the Choctaw language. The enemy never broke their code, and Allied leaders deemed their efforts a success.

For the remainder of the war, the Army continued to enlist tribal soldiers as code talkers, including the Cheyenne, Comanche, Cherokee, Osage and Yankton Sioux. When the U.S. entered World War II, military leaders remembered the success of the Choctaw code talkers and enlisted new recruits from the Navajo, Kiowa, Hopi, Creek, Seminole and other tribes to encrypt messages for the Army and Marine Corps.

On May 5, 1942, the first 29 Navajos arrived in San Diego, California, where they trained in the standard procedures of the military and in weapons use. Afterward, they received special courses in the transmission of messages and instruction in radio operation.

At Camp Elliott, the initial recruits, along with communications personnel, designed the first Navajo code. It consisted of 211 words, most of which were Navajo terms imbued with new, distinctly military meanings in order to compensate for the lack of military terminology in the Navajo vocabulary. For example, "fighter plane" was called "da-ha-tih-hi," which means "humming bird" in Navajo, and "dive bomber" was called "gini," which means "chicken

hawk." The code talkers also designed a system that signified the 26 letters of the English alphabet.

The Navajo soon demonstrated their ability to memorize the code and send messages under adverse conditions similar to military action, successfully transmitting the code from planes, tanks or fast-moving positions. The program was deemed so successful that an additional 200 Navajos were recommended for recruitment as messengers on July 20, 1942.

The primary strengths of the code talkers was the secrecy they ensured and the versatility with which they could be used. Compared to others, the Navajos provided a valuable line of communication by radio that was both secure and error-free. Capt. Ralph J. Sturkey, in his Iwo Jima Battle Report, called the Navajo code "the simplest, fastest, and most reliable means" available to transmit secret orders by radio and telephone circuits exposed to enemy wire-tapping. The Navajos also proved at Iwo Jima and in other battles to be excellent general-duty Marines, useful in a variety of operations.

It is estimated that 375 to 420 Navajos served as code talkers. The Navajo code talker program was highly classified throughout the war and remained so until 1968. Returning home on buses without parades or fanfare and sworn to secrecy about the code, the Navajo code talkers did not make their way into popular culture and mainstream American history until 2000. U.S. Sen. Jeff Bingaman from New Mexico introduced the "Honoring the Code Talkers Act," which was signed into law December 21, 2000 and called for recognition of the Navajo code talkers.

During a ceremony at the U.S. Capitol on July 26, 2001, the first 29 soldiers received the Congressional Gold Medal. The Congressional Silver Medal was presented to the remaining Navajos who later qualified to be code talkers. Bingaman's legislation was one attempt to answer the question of how the U.S. should document and remember the code talkers.

November is National American Indian Heritage Month. It is a time to reflect on the rich and diverse cultures, traditions and histories of American Indians and Alaskan Natives, the first people of the United States. Take time this month to reflect on the contributions of the Navajo code talkers and all American Indians and Alaskan Natives who have shaped the character and cultural heritage of the nation.

Employee 'proud and blessed' for Stennis experience

Cheryl Timko has a primarily "low-profile" position in the Stennis Space Center Office of Procurement, but she has a definite front-and-center presence when it comes to promoting cultural diversity and serving as a role model for young students.

A native of Romulus, Michigan, Timko grew up in nearby Plymouth. Her earliest space-related memory dates to the Challenger tragedy in 1986, viewed on a TV monitor rolled into the classroom for students to watch. "The sadness we all shared in that moment is something I will never forget," she said.

Timko served in the U.S. Army before accepting a corporate job in Colorado. In 2006, she migrated to Mississippi and began work as an administrative assistant at Stennis in 2006. She completed a masters degree in 2017 and moved from the contractor's ranks to join the NASA team as a contract specialist/officer.

Her current role is somewhat behind the scenes but critical to center operations. It involves "cradle to grave" duties, administering all aspects of various Stennis contracts. Timko currently is working on contracts related to diverse site projects, from refurbishment of potable water systems to rehabilitation of the E Test Complex deluge electrical systems to work on the B-2 Test Stand in preparation for exploration upper stage testing for the new Space Launch System (SLS) rocket.

Beyond those efforts, Timko has a much more visible presence in her role as a Special Emphasis Program manager for Alaska Native/Native American awareness. Special Emphasis Programs were established more than 40 years ago to focus attention on groups that have historically been absent or underrepresented in specific occupational categories or grade levels in the federal workplace.

As a special emphasis manager, Timko works to develop strategies to eliminate barriers to employment and career advancement for Alaska Natives and American Indians; to identify gaps and barriers in hiring, pay, promotion, training, awards and retention of such individuals; and to take proactive steps to eliminate discriminatory policies and practices and ensure equal opportunity for people in those groups.

Diversity is a key characteristic of the Stennis workplace, which

features a "plethora of different cultures," Timko said. "It is the most diverse group of people that I've ever been a part of. I think that contributes to why it's consistently ranked as one of the best places in the federal government to work."

Timko's oversight of contracts and special emphasis efforts both directly support NASA's Artemis Program, launched to return humans, including the first woman, to the Moon by 2024. The backbone of the Artemis Program is the new SLS rocket, which will be powered by engines and stages tested at Stennis. "In my contracting work, I support the Artemis Program by providing acquisition support," Timko explained. "In my Special Emphasis Program role, I contribute to Artemis by supporting a diverse team that includes employees who identify as special emphasis groups."

In addition to those twin roles, Timko gladly participates in community outreach when possible, whether it involves science fairs or visits to schools. "I am most proud of the example I can be for young female students, including my 13-year-old daughter," she said. "By getting out in the community and

sharing my story, perhaps I will be able to influence young women to seek out a career in a science or technical field and become a part of the NASA family."

There is a lot of story to tell for the Picayune resident who enjoys horseback riding and participates in the annual Dixie National Wagon Train ride from the Mississippi Gulf Coast to Jackson over a nine-day period. As a veteran, Timko carries the American flag on horseback in Picayune parades as well. She also has qualified to compete in national women's bodybuilding in 2020. And though she is just a few years into her career as a NASA team member, Timko has garnered quick recognition for her work. In 2018, she was awarded a NASA Early Career Achievement Medal for exceptional service, and outstanding leadership and professionalism.

Looking ahead, Timko voices excitement for the opportunity to be a member of the Stennis family and a part of space exploration history through her work on behalf of the Artemis Program. "I feel proud and blessed to be able to share in this experience with coworkers, friends and family alike," Timko said.



In addition to her work as a contracting specialist at Stennis Space Center, Cheryl Timko works as a Special Emphasis Program manager for Alaska Native/American Indian awareness.