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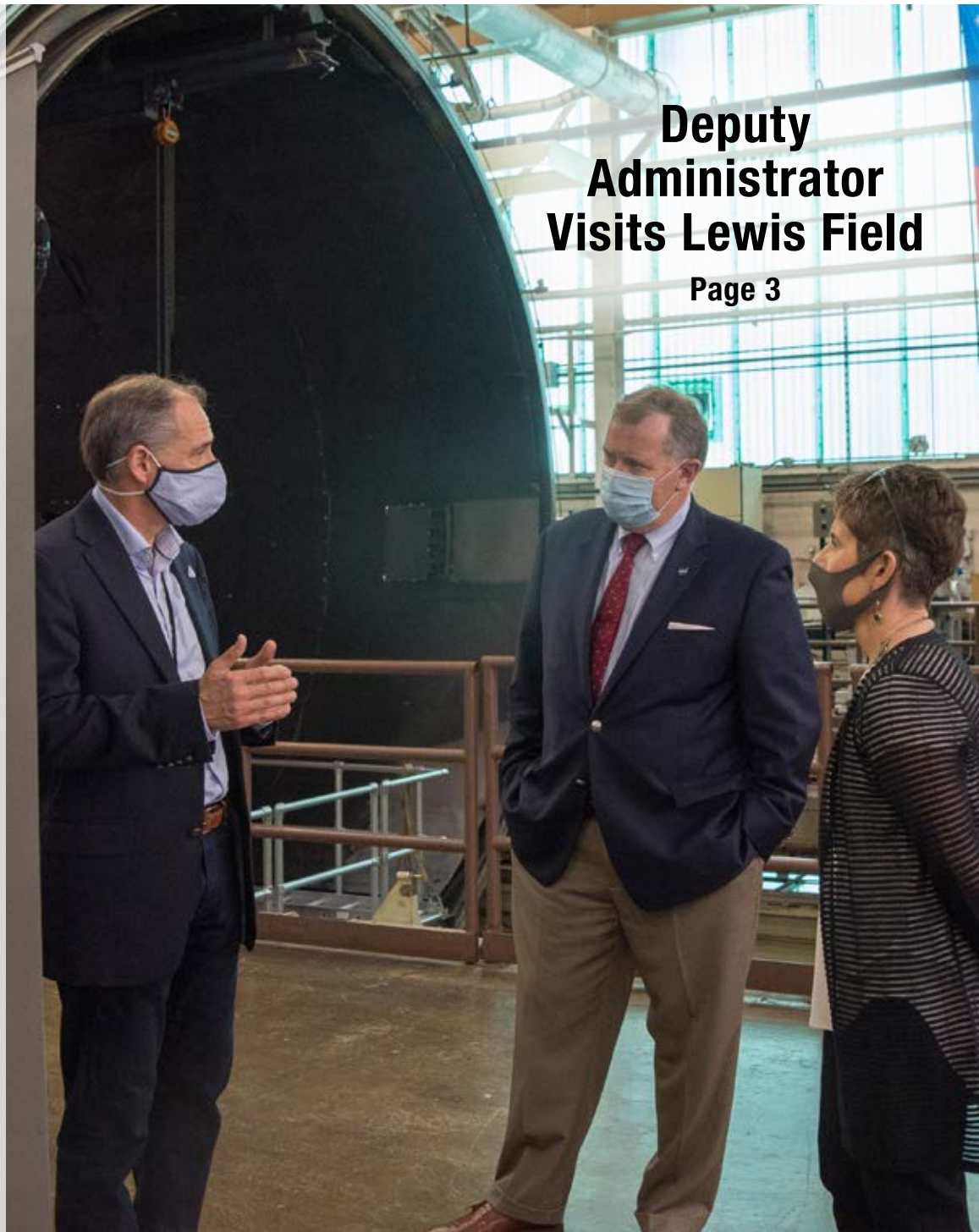

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Happy Holidays

As we approach the holiday season, I encourage you to schedule leave requests with your supervisor. It is important to take time for yourself and reenergize. As we gather with family and friends to celebrate the season, I urge you to not let your guard down and to practice safe COVID–19 protocols. The experts tell us it is in these small gatherings where the virus continues to spread, and we must stay vigilant for ourselves, our loved ones, our co-workers, and the NASA mission.

Safely enjoy the holidays!

AeroSpace Frontiers
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Submit short articles and calendar items to the editor at doreen.b.zudell@nasa.gov.

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NASA Releases First All-Inclusive Economic Impact Study

NASA has released its first-ever agencywide economic impact report. The report outlines a myriad of NASA activities that have generated more than $64.3 billion in total economic output during fiscal year (FY) 2019; supported more than 312,000 jobs nationwide; and contributed to the estimated $7 billion generated in federal, state, and local taxes throughout the United States.

Based on wages and benefits paid to Glenn civil service employees, agencywide funding of contracts sourced to Ohio companies, and estimated consumer spending, the study revealed a total economic impact to Ohio's economy of 11,139 jobs, $805.3 million in labor income, and $2.3 billion in economic output.

The report also examines the impact of the agency's Moon-to-Mars (M2M) program. The M2M program includes the landing systems, Moon and Mars science missions, ground support equipment, spacesuits, and the many technologies focused on returning humans to the Moon and cislunar space, with eventual missions to Mars and beyond. The study found that M2M-funded activities in the state of Ohio generated a total of 1,258 jobs and $302 million in economic output in FY 2019.

The study was conducted by the Nathalie P. Voorhees Center for Neighborhood and Community Improvement. A summary of the report is available at https://go.nasa.gov/3cxsYIU and the full report is online at https://go.nasa.gov/3i2tycr.

On the Cover:

While on tour in the Electric Propulsion Research Facility, Space Flight Systems Director Bryan Smith, left, discusses the mission advantages of electric propulsion with NASA Deputy Administrator James Morhard, center. Center Director Dr. Marla Pérez-Davis looks on.

GRC-2020-C-02783
Photo by Bridget Caswell

Deputy Administrator Morhard Visits Lewis Field

Center Director Dr. Marla Pérez-Davis and senior leaders welcomed Deputy Administrator James Morhard to Lewis Field on Sept. 28.

During his first visit to the center, Morhard was briefed on the state of the center, including the budget, facility issues and the facility master plan, and state and regional partnership activities. Morhard talked with the Glenn senior leadership team over lunch in the socially distanced Mission Integration Center auditorium.

GRC-2020-CN-00023 Photos by Bridget Caswell

Kevin McPherson, right, explains Glenn's ongoing International Space Station Science Operations in the Telescience Support Center. Pictured, left to right: Associate Director Larry Sivic, Morhard, Dr. Perez Davis, and Smith.

Pérez-Davis and Space Flight Systems Director Bryan Smith escorted Morhard to the West Area where they toured vacuum tanks 5 and 6 in the Electric Propulsion Research Facility. There they discussed the mission advantages of electric propulsion for science and human exploration.

"We reviewed the testing of the 12.5-kW Hall thruster testing in Tank 5," Smith said. "Glenn is testing the design of a development thruster that will be used for the Power and Propulsion Element on Gateway."

Morhard met with three engineers performing the testing and emphasized the criticality of the work in addition to specifically thanking them for their work throughout the pandemic.

GRC-2020-CN-00022

Hani Kamhawi, right, discusses the 12.5-kW electric propulsion thruster with Morhard while on tour.

They also toured the Telescience Support Center, where Morhard acknowledged the importance of the research on the International Space Station.

The visit concluded with a summary of the center's FY 2020 accomplishments.

"It was an honor to host our Deputy Administrator and highlight Glenn's critical roles and importance to the agency," Pérez-Davis noted. "We truly appreciate Jim's support and leadership."

By Doreen B. Zudell

Upgrades Prepare In-Space Propulsion Facility for Artemis Testing

Three of the accumulators have been recertified and steam piping has been constructed and insulated (seen in bright silver) to connect the steam accumulators. They are connected to the ejector train, which is used to remove rocket engine exhaust products from the test chamber during a hot-fire engine test.

As NASA prepares to send the first woman and next man to the Moon in 2024, Glenn is full steam ahead in support of the Artemis program. This includes a significant facility upgrade to Plum Brook Station's In-Space Propulsion Facility (ISP).

Formally known as B2, the facility has put powerful second-stage propulsion systems, like the RL–2, through hot-fire testing, long-duration simulated space environmental conditioning, and restart and cold soak testing.

Built in 1966 to support the Apollo program, the facility's last large-scale hot-fire test was performed in 1998. Due to the lack of funding and testing since then, several of the facility's major components fell into disrepair.

With the renewed interest in commercial launches and human exploration to the Moon and beyond, ISP has been undergoing a major overhaul to the steam ejector system, process water pumps, and other auxiliary systems over the past few years. This includes recertification and reactivation of three of the five 46,500-gallon steam accumulators, installation of new steam piping, and a new rental boiler and rental chiller interface. It also includes repairs to a 200-foot-long 24-inch water line located 30 feet below grade going into the facility. Work inside the test chamber includes a complete refurbishment of the four 120-foot-long vertical 2,000-horsepower water pump system and much needed structural repairs.

"This has been an excellent team effort over the past few years," said Facilities Project Manager Jim Davic. "They include personnel from the ISP facility; Facilities, Test and Manufacturing; Research and Engineering; Safety and Mission Assurance directorates; and the Pressure Systems Office, as well as over a dozen construction contractors and their subcontractors."

With the completion of these projects in the next few months, ISP will have the capability to support the development of the human landing systems for Artemis, as well as upper-stage rocket testing for NASA and commercial launch vehicles.

"This gives us the ability to simulate conditions at an altitude of 100,000 feet," said Hal Weaver, ISP facility manager. "It will enable the ISP facility systems to support testing of propulsion systems of up to 30,000 pounds thrust for 300 seconds of run time."

This photo shows a view looking up from the spray chamber floor of two of the four 2000 HP water pump impeller sections attached to the pump columns that lead up to the spray bars 120 feet above. Each 10 foot pump column-shaft section was removed, reconditioned and then reinstalled.

Glenn's Human Research Program Uses Space Station as State-of-the-Art Research Lab

In 2005, several of Glenn's human spaceflight health studies initially pursued under the auspices of the John Glenn Biomedical Engineering Consortium transitioned to NASA's newly established Human Research Program (HRP).

As we celebrate the 20th anniversary of the International Space Station, we are reminded how the consortium staff identified and mitigated a range of physiological problems caused by spaceflight. Their pioneering research in low-Earth orbit, the space station, and at a variety of ground-based facilities developed technology to forecast and prevent health risks associated with in-flight medical conditions.

Dr. Rafat Ansari, a former NASA research scientist, adapted a Glenn-developed laser technique called Dynamic Light Scattering. The portable, noninvasive probe peers into the eye to measure blood flow and better understand vision changes encountered in space. The eye-scanning procedure captures changes going on in the body to detect cataracts, diabetes, and Alzheimer's disease.

Glenn also collaborated with the Cleveland Clinic to develop a suite of zero-gravity locomotion simulators and associated ground-based technologies. These simulate in-flight (microgravity) and surface (partial gravity) exercise to advance the health and safety of current and next-generation astronauts. Glenn's Exercise Countermeasures Laboratory (ECL) is the most capable of these simulators. It allows human-in-the-loop testing for research and technology development, most notably the Glenn Harness, which improved the effectiveness of the astronaut treadmill exercise on the space station.

Astronauts must use a harness to attach themselves to the space station treadmill while walking or running in space due to the lack of gravity. The weight-bearing exercise afforded by treadmill running on the space station is thought to be crucial for effective gravitational loading of the musculoskeletal system and for bone health in space.

"Working on a project that has the potential to positively affect crew members so directly is very rewarding," said Gail Perusek, Glenn project manager with the HRP. "As long as we have manned spaceflight, humans will be exercising in zero gravity or even partial gravity, like on the Moon, and we'll need comfortable harnessing systems."

Glenn continues to support the HRP through a variety of experiments and ongoing research conducted on space station in the Fluids and Combustion facilities, managed and operated remotely from Glenn. The research conducted in each of these facilities has advanced technologies, systems, and practices to improve astronaut health and safety for future missions to the Moon and Mars.

By S. Jenise Veris

GRC-2007-C-01625 Photo by Marvin Smith

iss032e011701 Photo by NASA/JSC

Left: Astronaut Don Pettit demonstrates the zero-g simulation capabilities of Glenn's ECL used to study and improve astronauts' treadmill harness. Right: Astronaut Suni Williams simulates a marathon on the space station treadmill with the help of the flight-tested Glenn Harness.

Virtual Safety, Health Awareness Event Reflects Today's Challenges

GRC-2020-C-02637 Photo by Jef Janis

Clockwise: Morhard, Safety and Mission Assurance Director Konstantinos (Gus) Martzaklis, and Dr. Pérez-Davis discuss Glenn's contributions to safety and health.

Hundreds of employees tuned in to Glenn's annual Safety and Health Awareness event on Sept. 22, an all-virtual event this year, organized by the Safety and Mission Assurance Directorate (SMAD).

NASA Deputy Administrator James Morhard and Dr. Keith Armitage, infectious disease specialist with University Hospitals, headlined the event and were introduced by Center Director Dr. Marla Pérez-Davis.

Morhard, who survived a plane crash in a remote part of Alaska in 2010, talked candidly about the experience and his physical and emotional recovery process. He drew parallels to NASA's vigilance to safety preparedness and resilience and encouraged employees to draw on these tenets and always put people first while navigating the COVID–19 pandemic.

"Don't forget lessons from the past," Morhard said. "Be renewed in our vigilance to safety…do not take our lives for granted."

Armitage discussed currently available information on the coronavirus, as well as the importance of masks and social distancing, testing, types of medications, and promising vaccines.

"Stay vigilant when it comes to your safety and health," Armitage stressed. "Trust and follow public health authorities' recommendations."

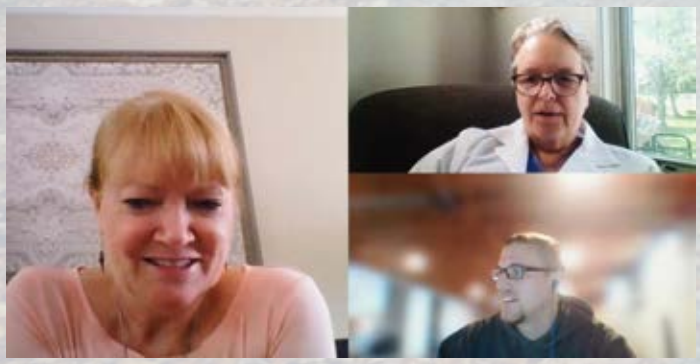
In addition to speaking events, vendors provided virtual presentations and answered questions on a range of topics. Some of these included ergonomics, domestic violence and child advocacy, personal protective equipment, the fitness center, medical services, return to on-site work, and the mission of the NASA Safety Center.

Mishap Investigation Board members Mike Milbert, Tim Czaruk, Manuel Dominguez, and James Smith presented a compelling mishap case study on an electrical transformer arc blast and subsequent fire, which took place on the center in May. This culminated in a review of lessons learned and a panel question-and-answer session.

The event concluded with a virtual health walk. Employees walked for 30 minutes and recorded their participation through the SMAD's Safety and Health Awareness Event (SHAE) website through Friday, Sept. 25.

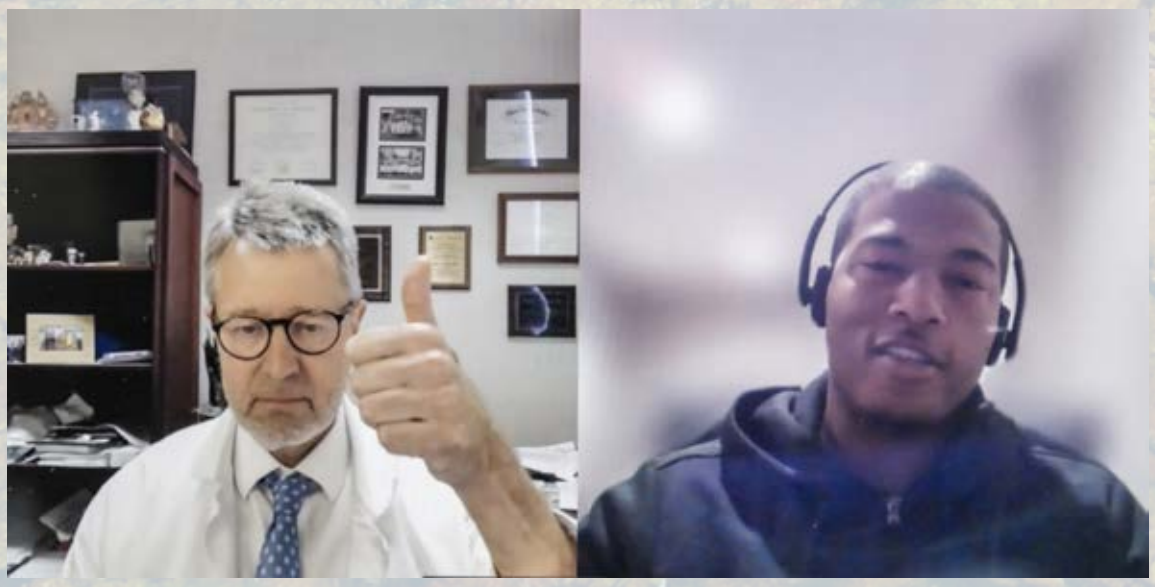
Safety and Health Division Chief Steve Herron served as chair, and Gail Skowron and Andrea Bonesteel served as co-chairs. Visit the SHAE website to view the speakers' presentations and health walk photos of employees, https://www.grc.nasa.gov/smad/shae-2020/.

By Doreen B. Zudell



GRC-2020-C-02689 Photo by Jef Janis

Medical Services staff members, clockwise, Patty Oleksiak and Dr. Susan Gifford, answer David Meigs' question about services during virtual vendor sessions.



GRC-2020-C-02670 Photo by Jef Janis

Dr. Armitage, left, and Herron chat during the health presentation.

VIRTUAL WALKERS

Glenn Joins COSI for Local Learning Lunchbox Roadshow

Center Director Dr. Marla Pérez-Davis made a virtual visit to a Center of Science and Industry (COSI) Back-to-School Statewide Roadshow stop in Parma, Ohio, Oct. 5. The roadshow helps support students as distance learning needs increase across the state. Families have the opportunity to drive through and pick up a free COSI Learning Lunchbox, a box filled with 5 days of science activities. During the event in Parma, Glenn partnered with COSI to help launch their new "Space Learning Lunchbox," which features content from NASA Glenn and highlights the Artemis mission.

GRC-2020-CN-00064

Dr. Pérez-Davis makes a virtual visit to COSI's Back-to-School Statewide Roadshow stop in Parma to help launch the Space Learning Lunchbox.

NEWS AND EVENTS

NSC Names Deputy Director

Conway

Robert Conway was appointed in June as the new deputy director of the NASA Safety Center (NSC). Conway works with the NSC director to enable more effective and efficient Safety and Mission Assurance support for NASA's portfolio of programs and projects. He manages the NSC's activities in knowledge sharing, technical excellence, mishap investigation, audits and assessments, and data analysis.

Conway retired from the U.S. Navy in 2012, where he began his safety-focused career serving as Commander Naval Air Forces Assistant Chief of Staff for Safety and director of the School of Naval Aviation Safety. He is a former member of the NASA Aerospace Safety Advisory Panel and most recently, Walt Disney World Resort manager of Quality Engineering for Worldwide Safety and Health.

Conway graduated from the U.S. Naval Academy and earned a Master of Science degree in aeronautical engineering from the U.S. Naval Postgraduate School. He holds several significant awards for military and public service.

Hundreds Receive On-Site Flu Vaccines

Glenn's Medical Services Clinic staff, with assistance from employees in the Center Operations; Facilities, Test and Manufacturing; and Office of the Chief Financial Officer directorates, distributed nearly 600 seasonal flu vaccines over a 7-day period in October. The clinic offered the 2020–2021 vaccines, free of charge, to badged civil servants and contractors working on-site and off-site. The vaccine was administered in the cafeteria as well as in the hangar at Lewis Field. Employees scheduled appointments to ensure social distancing.

GRC-2020–CN–00067

Photos by Angela Windau

GRC-2020–CN–00066

What's In Your NASA Moon Kit?

NASA will be conducting the last in a series of Green Run tests for the core stage of the Space Launch System—the most powerful rocket ever built. In recognition of the upcoming tests bringing us closer to launching humanity to the Moon, NASA asked its social media followers a question:

What would you take to the Moon?

Using the hashtag, #NASAMoonKit, followers posted photos of their Moon kits on NASA's social media accounts. Last month, Glenn's social media accounts kicked off the campaign by posting photos of Glenn's Imaging Technology Center photographers' kits. If you missed the campaign, visit @NASA's Instagram account and search for the hashtag #NASAMoonKit.

GRC-2020-CN-00068

Photo by Jordan Salkin

Glenn photographer Jordan Salkin packs the essentials, with a couple of goodies, in her Moon kit.

PROMOTIONS


Arnett

Lori Arnett has been selected the Data Systems and Security project manager for the Aerosciences Evaluation and Test Capabilities Portfolio Office. Arnett previously served as chief of the Data and Systems Branch within the Facilities, Test and Manufacturing Directorate.


Hartenstine

Christopher Hartenstine has been selected the Public Engagement Team lead in the Office of Communications. Hartenstine previously served as an education specialist with Paragon TEC in Glenn's Office of STEM Engagement, where he coordinated STEM opportunities for NASA's formal and informal education partners.


Simmons

Lynn Simmons has been selected the executive support assistant to Center Director Dr. Marla Pérez-Davis. Simmons previously served as administrative assistant to the Office of the Chief Financial Officer and, prior to that position, with the Aeronautics Directorate, both under Alcyon Technical Services, LLC.

RETIREMENTS

Thomas O. Cressman, Structural Mechanics Branch, Materials and Structures Division, retired Sept. 30, 2020, with 44 years of NASA service.


Cressman

William Schoren, Reliability and System Safety Engineering Branch, Program and Project Assurance Division, retired Sept. 30, 2020, with 37 years of federal service, including 32 with NASA.

MORE THAN A MEMORY


Blumenthal

Phillip Z. Blumenthal, 87, a 2005 retiree with a combined 49 years of federal and contracted service to NASA, died Sept. 20. Blumenthal was an electrical engineer who supported aeropropulsion research and testing in the supersonic wind tunnels that aided the Apollo space program. Blumenthal retired in 1988 from the Aeropropulsion Facilities and Experiments Division. He returned to manage the 1989 to 1991 renovation and upgrade to the tunnel complex while sharing his knowledge and mentoring for 17 more years. He worked across several contracts, most recently, Sierra Lobo.


Dawson

Ronald Dawson, 91, a 1992 retiree with 40 years of NASA service, died Oct. 5. Dawson graduated in the Mechanical Engineering Group of the 1953 Apprentice Class. He worked in several sections of the Engineering Design Division, from 1959 to 1980, before becoming project manager of the Small Engine Components Test Facility, Engine Research Building. Dawson joined the Fluid Systems Branch in 1987, where he earned a 1988 NASA Exceptional Engineering Achievement medal for creative and innovative engineering to advance aeronautical and space propulsion.

2020 CFC: Be the Face of Change and Impact the World!

The Combined Federal Campaign (CFC) is the world's largest annual workplace charity campaign, and NASA Glenn has been an important part of this 59-year philanthropic tradition. This year's theme is "Be the Face of Change."

The center held its virtual 2020 CFC Kickoff on Oct. 21, where the CFC Chair Mark Sorrells, Co-Chair Tonya Mitchell, and Loaned Executive Orlando Thompson were introduced. Additional guests discussed the importance of the campaign, and four local charities shared information about their important services.

"During this pandemic, our country has great needs. Glenn employees are given an opportunity to respond in a big way." Sorrells said. "Our goal this year is to raise more than $300,000 and 200 volunteer hours."

Glenn raised $270,000 and over 400 volunteer hours last year. The CFC allows employees to decide which nonprofit organizations to support and how many volunteer hours to pledge. It has more than 6,000 nonprofit organizations representing many causes, and supports nonprofit organizations that are local, national, or international.

The CFC provides a secure giving system that protects donor's personal information. Donor's data is anonymous unless they decide otherwise. The CFC allows a donor to give through payroll or annuity deduction, credit card, e-check, or time through volunteering opportunities. Donations can be a one-time gift or a recurring contribution. You decide where and when to give your time.

To learn more about the campaign and how to donate, visit the Glenn WING website. Once you are in, type CFC in the transporter, or go directly to https://cfcgiving.opm.gov/welcome, or ask your Keyworker for more information. The CFC concludes on Jan. 15, 2021.

OUTDOOR SIREN TESTING

The Emergency Management Office staff will conduct a mass notification voice test at bldgs. 100 and 302 on Wednesday, Dec. 2 at Lewis Field. They will conduct an audible siren test on the "emergency conditions" tone on Saturday, Dec. 5.

POC: Allen Turner, 216–433–6826

AEROSPACE TOASTMASTERS MEET

Improve communications and leadership skills through Aerospace Toastmasters. The group meets on Microsoft Teams on Thursdays from 12:05 p.m. to 12:50 p.m. Contact john.wang-1@nasa.gov, 216–433–3613, for more information. https://aerospace.toastmastersclubs.org/.

CORRECTION

The Solar Dynamic Collector testing for the Space Station Freedom photograph on page 7 in the October AeroSpace Frontiers was located in the Power Systems Facility at Lewis Field, not Plum Brook Station.

Deadline for next calendar section is **Nov. 18, noon**. News and feature stories require additional time.

SAVE THE DATE, Dec. 1, to participate in the Glenn Research Center Day of Service. All are welcome to volunteer their time as a center employee to assist with local charities. Look for details on Today@Glenn.

National Aeronautics and Space Administration

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Read AeroSpace Frontiers online at http://www.nasa.gov/centers/glenn/news/AF/index.html.

NASA Seeks Ideas for Powering Moon Exploration

As part of the Artemis program, NASA plans to establish a sustainable human presence on the lunar surface and validate systems and operations to advance exploration to Mars and beyond. NASA Glenn is managing the Watts on the Moon Challenge, NASA's newest public prize competition, which is now open and accepting submissions.

The competition is intended to generate ideas for power distribution and management systems and energy storage technologies to complement NASA investments in surface power generation, led by Glenn.

The Moon's extreme temperature swings, irregular periods of sunlight and darkness, and permanently shadowed craters where water might be harvested, all challenge existing state-of-the-art space power systems. NASA is developing technologies to provide sustainable power through the extreme environments of the lunar night, including fission surface power, solar power, and regenerative fuel cells.

The competition, supported by NASA's Space Technology Mission Directorate, will involve two phases. For Phase 1 of the competition, participants will submit competing designs for energy distribution, management, and storage addressing one or more of three hypothetical mission activities. For Phase 2, participants would implement their concepts for competitive testing in a NASA or third-party facility seeking to win prizes expected to total $4.5 million.

"NASA welcomes competitive innovation from outside the agency bringing their creativity into the national endeavor of sustainable space exploration," said Dr. Kurt Sacksteder, Glenn's Deputy Chief Technologist and lead for Watts on the Moon Challenge.

Individuals and teams interested in participating in the challenge can register and submit concept designs until 5 p.m. EDT on March 25, 2021. Visit https://www.herox.com/WattsOnTheMoon/138-registration.

By S. Jenise Veris