



# HIGH MACH

Serving the World's Premier Flight Simulation Test Complex



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## 704th Test Group Airman selected for STEP promotion

By Deidre Moon  
AEDC Public Affairs

**HOLLOMAN AIR FORCE BASE, N.M.** – In a special ceremony, Juwon Williams with the 586th Test Squadron, 704th Test Group, at Holloman Air Force Base, New Mexico, received a Stripes for Exceptional Performers promotion to the rank of technical sergeant Nov. 15.

Of this recognition, Williams commented that he's grateful to his leadership and his team.

"The STEP promotion shows me that consistency matters," he said. "Having open communication with your supervision matters and knowing the role you play within your organization matters."

Senior Master Sgt. Matthew Romero, senior enlisted leader for the Arnold Engineering Development Complex 704th Test Group, emphasized that a STEP promotion



Newly-promoted Tech. Sgt. Juwon Williams, left, 586th Flight Test Squadron Munitions Systems noncommissioned officer in charge, poses with U.S. Air Force Lt. Col. Sean Siddiqui, 586th FLTS commander, after a surprise promotion at Holloman Air Force Base, New Mexico, Nov. 15. Williams was selected for a Stripes for Exceptional Performers promotion, an annual program that authorizes commanders to directly promote by one rank a select few members performing at a level beyond their current rank. (U.S. Air Force photo by Tech. Sgt. Victor J. Caputo)

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The B-21 Raider was unveiled to the public at a ceremony Dec. 2 in Palmdale, California. Designed to operate in tomorrow's high-end threat environment, the B-21 will play a critical role in ensuring America's enduring airpower capability. (U.S. Air Force photo)

## B-21 Raider makes public debut; will become backbone of Air Force's bomber fleet

By Secretary of the Air Force  
Public Affairs

**PALMDALE, Calif.** (AFNS) – In a tangible display of the nation's resolve in meeting security threats, the U.S. Air Force, on Dec. 2, publicly unveiled the B-21 Raider, the first new, long-range strike bomber in a generation and an aircraft specifically designed to be the multifunctional backbone of the modernized bomber fleet.

While the B-21 isn't expected to be operational and introduced into service for several more years, the formal unveiling ceremony hosted by Northrop Grumman Corporation at its production facilities in California is a significant milestone in the Air Force's effort to modernize combat capabilities. The B-21 is designed

to be a more capable and adaptable, state-of-the-art aircraft that will gradually replace aging B-1 Lancer and B-2 Spirit bombers now in service.

According to design requirements, the B-21 is a long-range, highly survivable stealth bomber capable of delivering a mix of conventional and nuclear munitions. The aircraft will play a major role supporting national security objectives and assuring U.S. allies and partners across the globe.

Senior defense officials note that the National Defense Strategy and other analyses make clear the need for the B-21 and its capabilities.

"The B-21 Raider is the first strategic bomber in more than three decades," Secretary of Defense Lloyd J. Austin said during the ceremony. "It is a testament to America's endur-

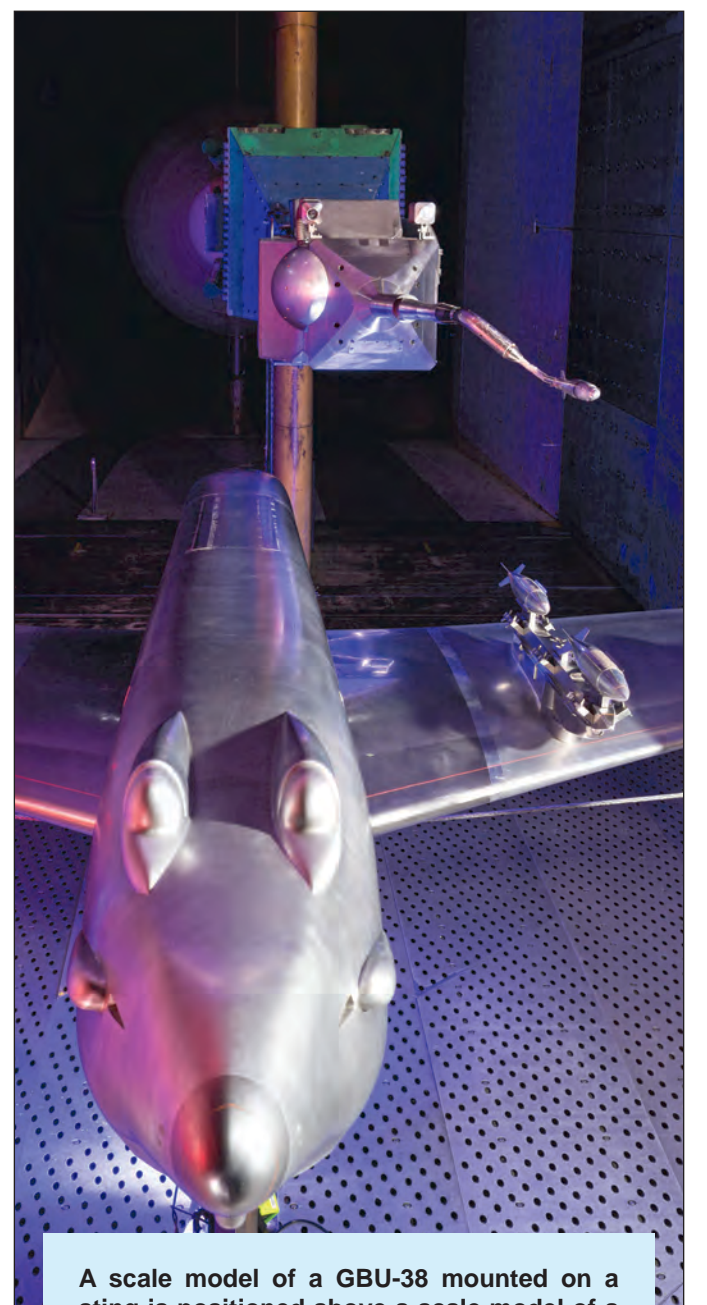
ing advantages in ingenuity and innovation. And it's proof of the Department's long-term commitment to building advanced capabilities that will fortify America's ability to deter aggression, today and into the future."

The B-21, Austin said, "is deterrence the American way. ... This isn't just another airplane. It's not just another acquisition. ... It's the embodiment of America's determination to defend the republic that we all love. It's a testament to our strategy of deterrence – with the capabilities to back it up, every time and everywhere."

The world and its threats have changed dramatically since the last new bomber was introduced in 1988, as has the

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## A look back at AEDC during 2022 ...



A scale model of a GBU-38 mounted on a sting is positioned above a scale model of a B-52 Stratofortress in the 16-foot transonic wind tunnel at Arnold Air Force Base Jan. 14. The GBU-38 was undergoing store separation testing with various captive load configurations. On the wing, seen in the right of the image, two GBU-31 bombs are installed on a heavy stores adapter beam. Aircraft models are installed upside down in the wind tunnel for store separation testing. (U.S. Air Force photo by Jill Pickett)

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Arnold  
Air Force  
Base



Col. Randel Gordon  
Commander

Jason Austin  
Chief,  
Public Affairs



Wayne Monteith  
General Manager,  
National Aerospace  
Solutions

High Mach Staff:  
Darbie Sizemore  
NAS Executive Editor

Jill Pickett  
NAS Editor

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- Ethics. We are uncompromising in our integrity, honesty, and fairness.
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- Security. We are disciplined and vigilant in protecting sensitive AEDC information and ensuring system integrity to support national security and our customers.
- Excellence. We thrive on challenge, accomplishment, and mission success.
- Quality. We are passionate about doing our work right the first time.
- People. We have a mission-focused, inclusive workforce who have a diverse skill set, are committed to success, demonstrate innovation and have a can-do attitude.
- Culture. Our team is proud of our diversity, inclusiveness, and collaborative work environment. We are proud of what we do and how we do it.
- Relationships. We build positive, long-term business relationships through trust, respect, and collaboration.
- Innovation. We overcome challenges through creativity, perseverance, technology, and flexibility. We actively seek to continually improve.
- Sustainability. We plan and act for the long term benefit of our communities and our environment.



*High Mach* has a new look to go along with the transition to being a digital publication. (U.S. Air Force graphic by Brooke Brumley)

# High Mach begins digital era Jan. 9

By Raquel March  
AEDC Public Affairs

After 67 years as a print publication, the base newspaper, *High Mach*, will launch in a digital format Jan. 9.

The digital version will be accessible on the Arnold Air Force Base website at [www.arnold.af.mil/HighMach](http://www.arnold.af.mil/HighMach) and will continue to feature the AEDC mission

and the Airman. Information may be viewed in the digital format as it becomes available.

For AEDC team members, a link to the digital content will be published in a bi-weekly email as well as QR codes posted in the Arnold AFB mission areas.

With the launch of the digital format, the *High Mach* staff will be able to focus on visual documentation of the mission and producing

more content that highlights team members' accomplishments.

"Through digital publishing we hope to bring more timely, engaging and interactive content allowing you to provide input to the products through your reactions, comments and sharing," said Jason Austin, AEDC Public Affairs chief, in a September *High Mach* editorial. "To do this, we will need your help. The Public Affairs team

cannot document and publicize what you and your team are doing if you don't reach out to us early and often."

*High Mach* readers may provide story suggestions and feedback by emailing [AEDC.Arnold-HighMach@us.af.mil](mailto:AEDC.Arnold-HighMach@us.af.mil).

Archived editions of the *High Mach* are available at <https://www.arnold.af.mil/News/High-Mach-Archives/>.

## Arnold AFB participates in Tullahoma Christmas Parade



A P-22 fire engine from Arnold Air Force Base Fire and Emergency Services is driven in the Tullahoma Christmas Parade Dec. 2 in Tullahoma. (U.S. Air Force photo by Jill Pickett)



Col. Randel Gordon, commander, Arnold Engineering Development Complex, waves as he rides in an Arnold Air Force Base Security Forces SUV during the Tullahoma Christmas Parade Dec. 2 in Tullahoma. (U.S. Air Force photo by Jill Pickett)

## AEDC personnel provide gifts for children through Gift Sponsor program

Arnold Engineering Development Complex team members Ryan Nash, right, and Daniel Gothard drop off gifts in the former barber shop at Arnold Air Force Base Dec. 12 during the 2022 AEDC Gift Sponsor drive, formerly known as the AEDC Angel Tree. Through the program, members of the Arnold workforce sponsor local children and purchase gifts based on each child's specified wants, which include toys, games and sports equipment, and needs specified for each child. These include shoes, socks, shirts and coats. The children on the Gift Sponsor list may not have otherwise received Christmas gifts from family members due to their financial situations and other hardships. This year, more than 125 children were sponsored through the Gift Sponsor program. (U.S. Air Force photo by Bradley Hicks)



## Smoking Policy

- The following revised Arnold AFB smoking policy is effective immediately and applies to all individuals on Arnold AFB.
  - Traditional Tobacco products (e.g. cigars and cigarettes):**
    - Smoking is permitted solely in Designated Tobacco Areas (DTAs) identified by designated signage. If no signage exists, smoking is not permitted in that area. It is the responsibility of all smokers to keep DTAs clean of cigarette butts.
    - Tobacco use on the Arnold AFB Golf Course is permitted, but discouraged based on the health hazards of tobacco use and secondhand smoke. No smoking is permitted within 50 feet of golf course buildings except in the approved DTA.
    - Smoking in government-owned/leased vehicles is strictly prohibited. Personnel are allowed to smoke in their personal vehicles at any time; however, at no time will personnel discard cigarette butts outside their vehicle.
    - For government employees, the fact that a person smokes has no bearing on the number of breaks they may take. Breaks should be taken in accordance with the current supervisory and personnel policies that afford all employees the same break opportunities consistent with good work practices and accomplishment of the mission.
  - Smokeless Tobacco products (e.g. snuff and dip):** Smokeless tobacco products are not to be restricted to DTAs. Smokeless tobacco use will be permitted in all workplace areas (inside and out) subject to reasonable safety and sanitary conditions. Specifically, containers of tobacco waste product, including sealed containers, must not be left unattended or disposed of in trash receptacles. Users of smokeless tobacco must flush tobacco waste down the toilet.
  - Electronic Cigarettes (also known as "e-cigs"):** Pursuant to Air Force Instruction (AFI) 40-102, Tobacco Free Living, e-cigs are considered to be equivalent to tobacco products; however, e-cigs are not restricted to DTAs and are allowed to be used outdoors at a minimum distance of 25 feet from building entry/egress points. (This policy is dated July 27, 2016)

## Action Line

Team AEDC,  
I believe in free and open communications with our Team AEDC employees, and that's why we have the Action Line available. People can use the Action Line to clear up rumors, ask questions, suggest ideas on improvements, enter complaints or get other issues off their chests.  
The Action Line has been expanded to include an option for your ideas, comments, or suggestions on the AcqDemo personnel system. Simply call the normal x6000 commander's action line. You will then be prompted to select option 1 for the Commander's Action Line or Option 2 for the AcqDemo line. They can access the Action Line via the AEDC intranet home page and by calling 931-454-6000.  
Although the Action Line is always available, the best and fastest way to get things resolved is by using your chain of command or by contacting the organization directly involved. I encourage everyone to go that route first, then if the situation isn't made right, give us a chance.

Col. Randel Gordon  
AEDC Commander

# 716th Test Squadron holds Open House, Family Day



Arnold Engineering Development Complex team member Michael Mills speaks about the 16-foot transonic wind tunnel to attendees of the 716th Test Squadron Open House and Family Day Nov. 21 at Arnold Air Force Base. The 716 TS conducts aerodynamic effects and store separation ground testing in wind tunnels located at Arnold AFB; White Oak, Maryland; and Mountain View, California. (U.S. Air Force photo by Jill Pickett) (This image has been altered by obscuring one or more badges for security purposes.)



Arnold Engineering Development Complex team member Rebecca Rought speaks about Tunnel A in the von Kármán Gas Dynamics Facility to attendees of the 716th Test Squadron Open House and Family Day Nov. 21 at Arnold Air Force Base. (U.S. Air Force photo by Jill Pickett) (This image has been altered by obscuring one or more badges for security purposes.)



Arnold Engineering Development Complex team member Ben Holton speaks to attendees of the 716th Test Squadron Open House and Family Day as they look at a model of the Propulsion Wind Tunnel Facility Nov. 21 at Arnold Air Force Base. (U.S. Air Force photo by Jill Pickett) (This image has been altered by obscuring one or more badges for security purposes.)

## PROMOTION from page 1

is a significant accomplishment for an enlisted member.

"To give a STEP promotion, we, the Air Force, are saying the member has earned and deserves the next rank without testing via the Weighted Airmen Promotion System and is able to

promote ahead of their peers," Romero said. "Very few enlisted folks will ever receive a STEP promotion. We are extremely proud of Juwon."

Williams, who has been at Holloman since April, serves as the 586th FLTS Munitions Systems

noncommissioned officer in charge.

"My position here encompasses more than just being AMMO [a munition system specialist]," he said. "We are different AFSCs [Air Force Special Codes] working as one. I never thought weapons and ammo could

work so seamlessly."

He added that he has a phrase that reminds him to always give his best.

"Something that lives freely in my head that my supervision says, 'Don't undermine who you are, and what you're capable of,'" Williams said.

## RAIDER from page 1

way the Air Force, other U.S. military services and allies work together as a joint, multi-domain force. Senior defense officials say that new thinking and innovation are needed to meet the new and emerging threats.

"That innovative spirit is sitting behind us right now," Air Force Chief of Staff Gen. CQ Brown, Jr., told reporters shortly before the plane was unveiled.

"You think about what we're able to do in the amount of time with the workforce here from Northrop Grumman, the collaboration with the United States Air Force to bring in a capability using a digital approach which is new and different from anything we've done any major program, that's part of the Raider spirit," he said.

The B-21 is the first new bomber to be introduced since the end of the Cold War. Air Force officials envision an ul-

mate fleet of at least 100 aircraft with an average procurement unit cost requirement of \$692 million (base year 2022 dollars).

"When I think about accelerate change, this is exactly what it means to be able to bring this kind of capability very quickly and be able to adapt it vis-à-vis the threat," Brown said in his meeting with reporters. "And so today, I'm really excited that we bring the B-21 Raider into the future. It'll be the backbone of our bomber fleet."

The aircraft is designed with updated stealth qualities and mission flexibility that senior leaders in the Air Force and across the Department of Defense say are necessary to achieve the U.S. goal of achieving integrated deterrence, and if necessary, capabilities required to successfully respond to aggression anywhere in the world at any time.

The specific B-21 unveiled Dec. 2 is one

of six under production. Each is considered a test aircraft, but each is being built on the same production line, using the same tools, processes, and technicians who will build production aircraft. This approach has enabled production engineers and technicians to capture lessons learned and apply them directly to follow-on aircraft, driving home a focus on repeatability, producibility and quality.

The timing for first flight will be data and event, not date driven.

While the precise date when the B-21 will enter service is unknown, basing decisions have been made. Ellsworth AFB, South Dakota will become the first Main Operating Base and formal training unit for the B-21. Whiteman AFB, Missouri, and Dyess AFB, Texas, are the preferred locations for the remaining home bases. Each will receive aircraft as they

become available.

In addition to building a bomber with state-of-the-art technology and capabilities, Air Force officials emphasized the focus on containing costs while simultaneously allowing for maximum flexibility.

For example, the B-21 is designed with an open systems architecture that will enable rapid future capability integration to keep pace

with the highly contested threat environment.

The B-21 design is based on firm requirements with existing and mature technology to control program costs. In fact, the plane's prime contractor, Northrop Grumman, has been directed to use production processes, production tooling, and a production workforce that ensures sustained and seamless production while avoid-

ing unnecessary costs.

"Leveraging innovative manufacturing techniques, open systems architectures and active management allows us to integrate new technology as it matures and ensures the B-21 can adapt to future threats and be successful when and where we need it," Assistant Secretary of the Air Force for Acquisition, Technology and Logistics Andrew P. Hunter, said.

# AEDC 2022 Year in Review



Lt. Col. John McShane, then chief of the Aerodynamics Test Branch, Test Division, Arnold Engineering Development Complex, speaks with Gen. Arnold W. Bunch Jr., then commander, Air Force Materiel Command, while showing him around Tunnel B, a hypersonic aerodynamic wind tunnel of the von Kármán Gas Dynamics Facility at Arnold Air Force Base, headquarters of AEDC, Jan. 27. (U.S. Air Force photo by Jill Pickett)



Winners of Arnold Engineering Development Complex annual awards and Air Force Test Center Contracting annual awards pose for a photo with AEDC leadership Feb. 11 after the awards ceremony at Arnold Air Force Base. (U.S. Air Force photo by Jill Pickett)



Melissa Tate, then lead engineer and deputy of the Propulsion Test Branch, Test Division, Arnold Engineering Development Complex, stands outside the Engine Test Facility at Arnold Air Force Base March 1. In April she became the site director for the McKinley Climatic Laboratory at Eglin Air Force Base, Florida. She is the first female to serve in this role. MCL, an operating location of the AEDC 717th Test Squadron, is used to conduct climatic testing of various military and commercial systems. (U.S. Air Force photo by Deidre Moon)



Arnold Air Force Base Fire and Emergency Services personnel operate a bumper turret spraying water as they train March 3 on aircraft rescue and firefighting techniques at the base. (U.S. Air Force photo by Jill Pickett)

Prior to their removal, disassembled pieces of Tunnel E sit in a building that housed the old wind tunnel at the von Kármán Gas Dynamics Facility on Arnold Air Force Base March 4. Tunnel E, a pilot facility first named E-2, was decommissioned in the late 1970s. Key parts of the wind tunnel had previously been excessed. The remaining parts were removed to make room for Tunnel D support and future opportunities for research. (U.S. Air Force photo by Jill Pickett)



# AEDC 2022 Year in Review



Christopher Romanoski, left, an aerospace engineer with the 717th Test Squadron, 804th Test Group, Arnold Engineering Development Complex, and Zack Wallace, right, an engineer with Core Parts, bolt a flange into place while assembling an instrumented small engine test stand March 9 in the Propulsion Research Facility at the University of Tennessee Space Institute within the confines of Arnold Air Force Base. Also pictured are, from second from left, Seth Markum, aerospace engineer with the 717 TS, Tab Heffernan, a senior engineer with Core Parts, and Jeff Chasteen, an AEDC test operations engineer. The project was a Small Business Innovation Research-funded effort completed by Core Parts. (U.S. Air Force photo by Jill Pickett)



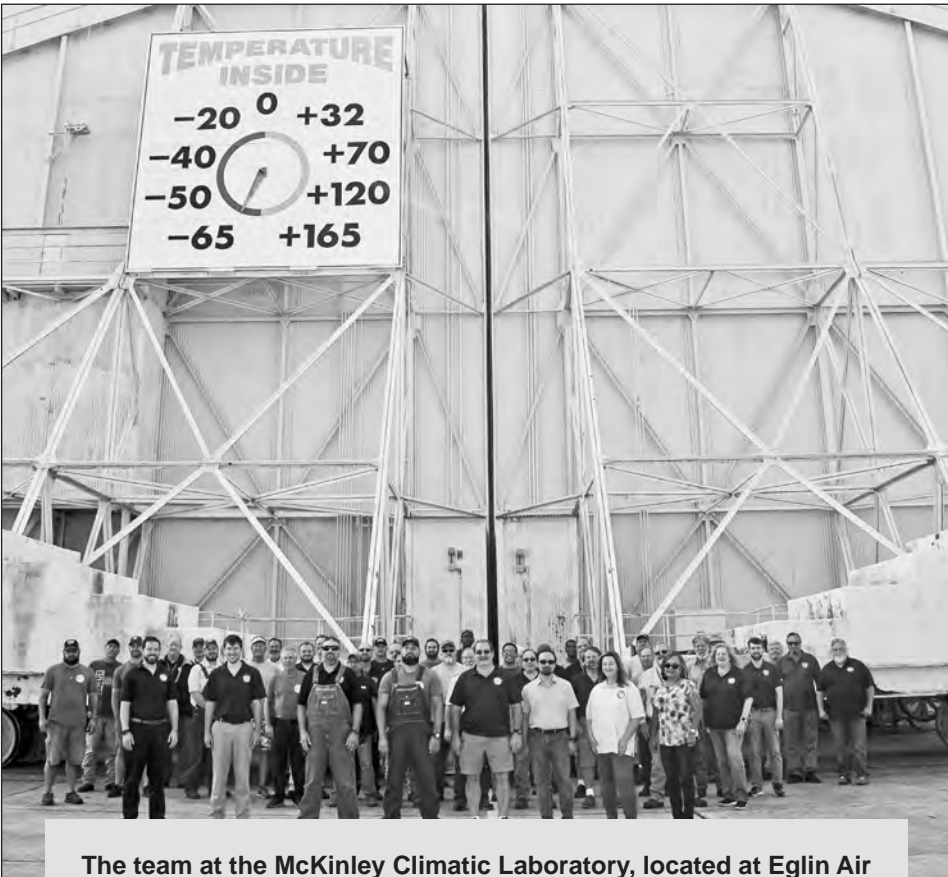
Arnold Engineering Development Complex Hypervelocity Wind Tunnel 9 team members look on as the test crew executes the 5,000th run at the facility located in White Oak, Maryland, April 11. Tunnel 9, which became an Air Force facility in 1997, provides aerodynamic and aero-thermal ground test simulation environment for the development of hypersonic systems; including altitude regimes associated with strategic missile systems, advanced defensive interceptor systems and hypersonic vehicle technologies. (U.S. Air Force photo)



From left, Dr. Phil Kreth and Haley Goldston, with the University of Tennessee Space Institute, set up equipment in SL-2, a sea level turbine engine test cell at Arnold Air Force Base April 27 to observe and record shadowgraph data of the air flow from various nozzles. The shadowgraph measurements of high sound pressure level nozzle acoustic events were to be used to validate computational fluid dynamics prediction methods. (U.S. Air Force photo by Jill Pickett) (This image has been altered by obscuring a badge for security purposes.)



A multi-path, broadband infrared light source, foreground, and hyperspectral infrared imager are set up opposite each other with a towed airborne plume simulator burner installed in the High-Speed Fan Facility shooting a blast of fire and smoke between them during testing of the missile plume transmittance measurement system from Physical Sciences Inc., Arnold Air Force Base May 12. Another set of light source and imager were also set up at a different angle to complete the measurement system. (U.S. Air Force photo by Jill Pickett)



The team at the McKinley Climatic Laboratory, located at Eglin Air Force Base, Florida, pose for a photo outside of the Main Chamber of the facility May 17. The team recently celebrated the 75th anniversary of the facility. The first tests at the MCL occurred in May 1947. The MCL, which is capable of producing a temperature range from minus 65 degrees Fahrenheit to 165 degrees Fahrenheit, can simulate any climatic environment in the world and is used to conduct a variety of climatic testing for the Department of Defense, other government agencies and private industry. The MCL is operated by the 717th Test Squadron, 804th Test Group, Arnold Engineering Development Complex. (U.S. Air Force photo by Bruce Hoffman)



Col. Jeffrey Geraghty, right, then commander of the Arnold Engineering Development Complex, faces off with Brian Allen, operations manager for the AEDC Test Support Division, playing the role of an agitated driver, during a traffic stop. The roleplay was part of an interactive Security Forces demonstration for AEDC wing-level staff May 18 at the Volunteer Training Site Tullahoma Range Complex, Arnold Air Force Base. Several Team AEDC members were given an opportunity to attempt a mock traffic stop, respond to a mock call for service, and shoot at the pistol and rifle ranges. The weapons used during the mock scenarios fired Simunitions. Security Forces offices conducted the training to demonstrate the capabilities of the branch's weapons systems to AEDC leadership. (U.S. Air Force photo by Jill Pickett)

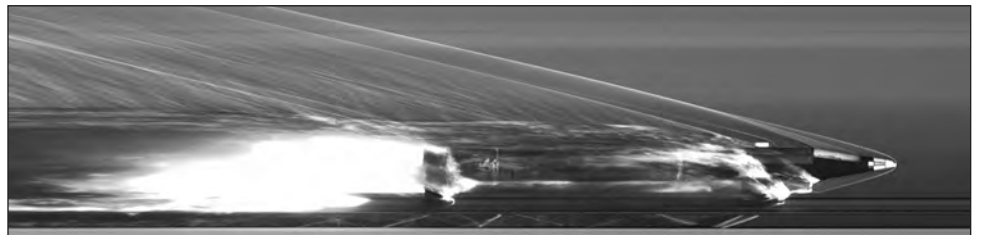
# AEDC 2022 Year in Review



Col. Jeffrey Geraghty, left, then commander, Arnold Engineering Development Complex, stands for a photo with the leaders of the newly-activated 804th Test Group, the 716th Test Squadron, 717th Test Squadron, 718th Test Squadron and 804th Test Support Squadron during a ceremony at Arnold Air Force Base May 20. The group and squadrons were activated as part of reorganizing AEDC to align with the traditional Air Force structure. Virtually every high-performance flight system in use by the Department of Defense today and all NASA manned spacecraft have been tested by AEDC. Today, the complex is testing the next generation of aircraft and space systems. From left, also pictured are Col. Lincoln Bonner, then commander of the 804 TG; Lt. Col. John McShane, then commander of the 716 TS; Lt. Col. Lane Haubelt, commander, 717 TS; Lt. Col. Dayvid Prah, 718 TS; and Josh Meeks, director, 804 TSS. (U.S. Air Force photo by Jill Pickett)



Air Force Test Center Commander Maj. Gen. Evan Dertien, left, hands the Arnold Engineering Development Complex guidon to Col. Randel Gordon charging him with command of AEDC during the Change of Command Ceremony June 16 in the Aircraft Test Support Facility at Arnold Air Force Base. AEDC encompasses 68 test cells, facilities, ranges and offices at 10 locations across the U.S. Also pictured are Col. Jeffrey Geraghty, right, previous AEDC commander, and Chief Master Sgt. Jennifer Cirricione, senior enlisted leader, AEDC. (U.S. Air Force photo by Jill Pickett)



A hypersonic sled travels 6,400-feet per second on a monorail and is recovered as part of the Hypersonic Sled Recovery effort at the Arnold Engineering Development Complex Holloman High Speed Test Track at Holloman Air Force Base, New Mexico. This test marked the fastest recovery of a monorail sled in more than 30 years. (U.S. Air Force photo)



Arnold Engineering Development Complex Commander Col. Randel Gordon, left, passes the 804th Test Group guidon to Col. Jason Vap charging him with command of the group during a change of command ceremony June 21 in the Aircraft Test Support Facility at Arnold Air Force Base. Personnel of the 804 TG support and execute ground and flight test activities, and develop, sustain and operate more than 30 test facilities throughout the U.S. Also pictured are Col. Linc Bonner, right, previous 804 TG commander, and Capt. Christopher Fernandez, guidon bearer. (U.S. Air Force photo by Jill Pickett)

Kyle Lukacovic, left, a test engineer at the National Full-Scale Aerodynamics Complex, and Paul Gilles, an NFAC instrumentation engineer, look around the 40-foot by 80-foot Wind Tunnel of NFAC at Moffett Field, California, where a flow characterization study was recently completed. During the multi-phased effort, updates were made to the existing flow calibration and characterization in the tunnel. Pictured behind Gilles and Lukacovic is the test rig used for the flow evaluation. NFAC is an operating location of the 716th Test Squadron, 804th Test Group, Arnold Engineering Development Complex. (U.S. Air Force photo) (This image was altered by obscuring a badge for security purposes.)



Scottie Stevens, an aerospace outside machinist, uses hand signals to direct a crane operator to lower a basket with an item to be cleaned June 29 in the chemical cleaning yard at Arnold Air Force Base. The vat contains one of two newly-acquired citrus-based cleaners purchased to replace hydrofluoric acid, a more dangerous chemical. Workers are able to wear less personal protective equipment with the new cleaner. Stevens is wearing a Tyvek suit, but had he been wearing long sleeves, he could have worn an apron instead, in addition to the gloves and face shield. (U.S. Air Force photo by Jill Pickett)



Ben Holton, right, deputy, 716th Test Squadron, 804th Test Group, Arnold Engineering Development Complex, uses a model of the Propulsion Wind Tunnel facility at Arnold Air Force Base to explain how the wind tunnels operate to Gen. Duke Z. Richardson, left, commander, Air Force Materiel Command, Aug. 26. The PWT facility has two 16-foot wind tunnels, one transonic and one supersonic, and one 4-foot transonic wind tunnel. The 16-foot transonic wind tunnel is the largest one in the U.S. used for store separation testing. (U.S. Air Force photo by Jill Pickett) (This image has been altered by obscuring a badge for security purposes.)

# AEDC 2022 Year in Review



Col. Jason Vap, left, commander, 804th Test Group, passes the 719th Test Squadron guidon to Lt. Col. Jason Heersche, charging him with command of the squadron during a change of command ceremony at Hill Air Force Base, Utah, Aug. 31. The 719 TS, a unit of AEDC, supports developmental testing of Intercontinental Ballistic Missiles. Also pictured is Master Sgt. Sean Haugan, guidon bearer and superintendent, Air Force Operational Test and Evaluation Center Detachment 3. (Courtesy photo)



Col. Randel Gordon, commander, Arnold Engineering Development Complex, passes the guidon to Col. Karl Seekamp, charging him with command of the 704th Test Group during a ceremony Sept. 9 at Holloman Air Force Base, New Mexico. The 704 TG operates test facilities for high speed sled track testing, navigation and guidance system testing, radar signature measurements, weapon systems flight testing, and Air Force Liaison for all AF programs tested at White Sands Missile Range. (U.S. Air Force photo by Airman 1st Class Corinna Diaz)



Col. Jason Vap, commander, 804th Test Group, Arnold Engineering Development Complex, serves the first piece of cake to 2nd Lt. Ben West, 718th Test Squadron, 804th Test Group, during a celebration of Air Force's 75th birthday at the Arnold Lakeside Complex Sept. 16 at Arnold Air Force Base. Per tradition, the cake was cut by the longest-serving and shortest-serving Airmen in attendance. Vap has served for 28 years. West began his Air Force career in August. (U.S. Air Force photo by Jill Pickett)



Arnold Engineering Development Complex team members compete in volleyball during the Arnold Air Force Base Sports Day at the Arnold Lakeside Complex Oct. 5. (U.S. Air Force photo by Jill Pickett)



An amphibious Navy Landing Craft Air Cushion is showered with freezing rain in -10-degree temperatures in the McKinley Climatic Lab Oct. 6 at Eglin Air Force Base, Florida. MCL, an operating location of the AEDC 717th Test Squadron, is used to conduct climatic testing of various military and commercial systems. The LCAC, from Naval Surface Warfare Center Panama City, underwent climate testing in the Lab's large chamber. (U.S. Air Force photo by Samuel King Jr.)





# Aerodynamic technologies for mobility aircraft promise high return on investment

By Secretary of the Air Force  
Public Affairs

WASHINGTON (AFNS) – As part of its effort to increase readiness and capability, the Air Force is working to introduce aerodynamic technologies on mobility aircraft to improve airflow, reduce maintenance issues, increase payload capability, and decrease fuel demand. Air Mobility Command, the Air Force Research Laboratory, and Air Force Operational Energy have partnered with commercial vendors to research, design, test, and certify a number of these innovations into the mobility fleet, including the KC-135 Stratotanker, C-17 Globemaster III, and C-130 Hercules. Each initiative is at various phases of development and transition, gaining momentum with the influx of funding from the Fiscal Year 2022 Presidential Budget.

“Optimization programs like these just make sense for the Air Force,” said Deputy Assistant Secretary of Air Force Operational Energy Roberto Guerrero. “My office has been working to advance initiatives that not only make us smarter about how we consume fuel, but also help to prevent maintenance issues, increase engine performance and improve mission planning.”

After several years of research and testing, microvanes for the C-17 are in the process of airworthiness certification at the AFRL and the Air Force Life Cycle Management Center. Microvanes are small 3D-printed structures that attach to the aft-end of the fuselage. The fin-like shape helps redirect airflow in this higher drag area, streamlining the aerodynamics and reducing overall fuel demand by approximately 1%.

When installed across the C-17 fleet, including Air National Guard and Air Force Re-



The drag reduction devices known as microvanes are shown on the aft-end of a C-17 Globemaster III at Joint Base Lewis-McChord, Washington. (U.S. Air Force photo)

serve aircraft, the Air Force estimates the microvanes will pay for themselves in fuel savings in seven months, and save over \$10 million per year.

The Air Force is evaluating vertical wiper blades on the KC-135 as another airstream drag reduction project that will improve fuel economy, range, and capacity. Across the KC-135 fleet, windshield wiper blades have been placed horizontally for over 60 years; however, aerodynamic ground testing confirmed that adjusting the wipers to sit vertically will optimize the aircraft by about 1%, a potential fuel savings of over \$7 million across the fleet. Now, the wipers will progress to air-

worthiness flight testing where they will be installed on several aircraft.

The KC-135 has also been undergoing testing for a replacement engine fan duct panel that can better withstand corrosion and water contamination. The current KC-135 fan ducts have aluminum panels which are susceptible to corrosion and degradation when exposed to water and debris over an extended period of time. The current repair to this corrosion inhibits airflow to the engine, reducing performance and increasing fuel use by an estimated \$5.5 million each year. Additionally, aircraft are often out of operation for over two days while the main-

tenance crews work to fix this recurring issue that affects a majority of the KC-135 fleet.

The replacement panel is made of a composite material that is impervious to similar degradation and corrosion. This one-time fix will eliminate frequent inspections and panel repairs. Flight evaluations start this December and run through February. Once certified, the team hopes to replace the panel across the entire KC-135 fleet.

These initiatives are just a select few that are farthest along in their development. However, the Air Force is working with the commercial industry and defense partners on several other optimization initiatives includ-

ing other drag reduction efforts, engine sustainment and propulsion improvements for legacy aircraft, mission planning software upgrades, process optimization, transformational aircraft body designs, and more.

As part of the Air Force’s effort to ‘Accelerate Change,’ these programs aim to increase readiness and capability, and address a ‘Logistics Under Attack’ scenario. At the same time, they support the Department of Defense’s climate mitigation goals as part of President Biden’s executive order: Tackling the Climate Crisis at Home and Abroad, as well as the newly released Department of the Air Force Climate Action Plan.



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## DECEMBER 2022

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## Arnold Services December & January Holiday Hours

<b>Arnold Lakeside Complex</b>	<b>Café 100</b>	<b>Fitness Center</b>
<p><b>Dec 9: Closed</b> <b>Dec 19 - Jan 5: Closed</b></p>	<p><b>Dec 23 - Jan 2: Closed</b></p>	<p><b>Dec 23-24: 8am - 1pm</b> <b>Dec 25-26: Closed</b> <b>Jan 1-2: Closed</b></p>
<b>Golf Course</b>	<b>Outdoor Recreation</b>	<b>Wingo Inn</b>
<p><b>Dec 25: Closed</b></p> 	<p><b>Dec 24 -26: Closed</b> <b>Jan 1-2: Closed</b></p>	<p><b>Dec 25-26: Closed</b> <b>Jan 1-2: Closed</b> <b>On-Call Phone Available 24/7</b></p>

# Peanut butter, jelly & bread

*For US troops, the PB&J sandwich perhaps dates back to WWI 'Doughboys' who just wanted to stretch their rations*

By DeCA Corporate Communications

**FORT LEE, Va.** – Mention PB&J to an American soldier, and many can recall making that “perfect” peanut butter and jelly sandwich to hit the spot when their stomach needed a quick, tasty snack.

No one knows who invented the PB&J, but for U.S. service members that sandwich goes back to at least World War I when enterprising troops combined elements of their rations to create a culinary masterpiece.

“Troops in the field have always been quite imaginative when it comes to making a tasty treat out of an otherwise bland ration,” said Marine Sgt. Maj. Michael R. Saucedo, senior enlisted advisor to the Defense Commissary Agency director. “Back in garrison, service members and their families need only visit their commissary to find the peanut butter, jelly and bread they require for their pièce de résistance – at savings of at least 25 percent compared to commercial stores.”

So, what’s the story behind peanut butter, jelly and bread in the U.S. military? Well, let’s take the ingredients

one at a time, starting with bread.

Regardless of what kind of sandwich you like, the foremost ingredient is a good bread. Throughout history, bread was one of the most common items given to U.S. troops in their daily ration. Troops could expect a pound of flour or a loaf of baked bread. In fact, bread was such a common item in rations that military branches would eventually open their own baking schools and bakeries.

During the American Revolution when baked bread wasn’t available, troops made fire or ash cakes by mixing together flour from their rations, water and a pinch of salt. They would then lay the dough over the warm ashes to bake. Sailors at sea were served ships’ biscuits, also known as hardtack. The weevils and maggots that often infested them were just an added source of “protein.”

During the American Civil War, hardtack was still standard fare for soldiers, however the Union Army had bakeries where thousands of loaves of fresh bread were baked each day, often shipped by train and arriving while it was still fresh and warm.

When America entered World War I, bakeries were providing fresh, hot bread to the troops in the trenches each day, and by World War II, bread was being included in C-rations and served in mess halls.

During the Korean War, U.S. soldiers were receiving ration cans with various types of bread and crackers. The B-ration was known as the bread ration, and it held a slice of bread, some crackers and usually a cookie or slice of cake.

Now let’s talk about peanut butter. Americans each eat more than 6 pounds of peanut butter every year. One peanut butter sandwich contains at least 6 grams of protein and over 3 grams of dietary fiber. It’s also rich in vitamin E and magnesium. Add jelly to the sandwich and you have about 15 grams of carbohydrates, giving you plenty of energy.

Soldiers in both world wars, the Korean War and Vietnam War were issued a one-and-a-half ounce can of creamy peanut butter in their rations. Most of the cans were issued in B-ration kits along with crackers and the dessert entrée.

The trio of peanut butter, jelly and bread seems to have collided for soldiers during World War I. Many of them began taking the bread ration, peanut butter spread and concord grape jelly and adding them together to stretch their rations. Throughout World War II, soldiers continued to create PB&J sandwiches from the ingredients in their B-ration kits. Meat shortages during the wars made the sandwiches an important protein source.

Saucedo encouraged patrons to use DeCA’s new mobile app to go online to order their peanut butter, jelly, bread and more through DeCA’s Commissary CLICK2GO online payment and curbside pickup program. The app is free for download via the Google Play and iOS app stores for Android and Apple devices, respectively.

“If your family loves peanut butter and jelly sandwiches like mine does, then head to your local commissary, where you’ll find a wide selection of peanut butter and jelly, as well as several varieties of fresh bread,” Saucedo said. “We even have our own Commissary Store Brands, such as Freedom’s Choice, to save you even more money.”

## Air Force conducts first ARRW operational prototype missile test

By Ilka Cole

96th Test Wing Public Affairs

**EGLIN AIR FORCE BASE, Fla. (AFNS)** – A B-52H Stratofortress successfully released the first All-Up-Round AGM-183A Air-launched Rapid Response Weapon off the Southern California coast, Dec. 9.

This test was the first launch of a full prototype operational missile.

Previous test events focused on proving the booster performance. Following the ARRW’s separation from the aircraft, it reached hypersonic speeds greater than five times the speed of sound, completed its flight path and detonated in the terminal area.

Indications show that all objectives were met.

“The ARRW team successfully designed and tested an air-launched hypersonic missile in five years,” said Brig. Gen. Jason Bartolomei, Armament Directorate Program executive officer. “I am immensely proud of the tenacity and dedication

this team has shown to provide a vital capability to our warfighter.”

The 412th Test Wing at Edwards AFB, California, executed the ARRW test flight.

ARRW is designed to enable the U.S. to hold fixed, high-value, time-sensitive targets at risk in contested environments.

## AFMC Connect December focus: Inspire



(U.S. Air Force graphic)

By Marisa Alia-Novobilski  
Air Force Materiel Command

**WRIGHT-PATTERSON AIR FORCE BASE, Ohio** – The ancient Greek philosopher Epictetus once said, “The key is to keep company only with people who uplift you, whose presence calls forth your best.” This simple quote relates strongly to the AFMC Connect focus for December, which is “inspire.”

Inspiration is a key component of productivity, creativity and success in the workplace. An individual who is inspired by a particular mission or task is more likely to complete an assignment efficiently and will work hard to achieve organizational goals.

A supportive, encouraging work environment has been found to increase productivity, employee engagement and self-esteem. By inspiring individuals to reach for goals and achieve success,

leaders foster an inspirational environment that benefits the individual, the unit and the organization.

Leaders can foster inspiration in the workplace by:

- Creating opportunities for engagement and celebration
- Encouraging collaboration
- Supporting individuals in their goals
- Serving as a source of inspiration for others

For more information on this month’s AFMC Connect focus, visit <https://www.afmc.af.mil/Portals/13/AFMC%20Connect%20-%20INSPIRE%20%28Dec%202022%29.pdf>.

Additional information on the AFMC Connect program and resiliency is available at <https://www.afmc.af.mil/Resiliency/Connect/>.

# Winter Weather: Ice-Related Hazards



Cold weather can be dangerous, or even deadly. The best time to prepare for severe winter weather is now, before temperatures drop significantly and staying safe and warm becomes a challenge. (U.S. Air Force graphic)

By Greg Chadwick

Air Force Materiel Command Health & Wellness Team

**WRIGHT-PATTERSON AIR FORCE BASE, Ohio** – Cold weather brings many risks and hazards with it. Sleet and snow can create a higher risk of car accidents and injuries from slipping and falling. Ice storms can damage utility lines causing power outages. Temperatures below freezing can cause pipes in your home to leak due to expanded, frozen water within.

Cold weather can be dangerous, or even deadly. The best time to prepare for severe winter weather is now, before temperatures drop significantly and staying safe and warm becomes a challenge.

## How to Stay Safe in an Ice Storm

An ice storm is a freezing rain event where a significant, possibly damaging, accumulation of greater than 0.25 inches of ice occurs. Ice can increase the weight of tree branches up to 30 times and can add 500 pounds of extra weight to power lines. A heavy accumulation of ice can topple power and telephone lines, broadcasting towers, and trees.

Unlike snowstorms where in most cases the snow can be plowed in hours or a day, the damaging effects of ice storms can last for days. Travel may be extremely difficult and dangerous due to ice covered roads, downed trees, and power lines.

When an ice storm and/or significant icing is forecast, you should prepare ahead of the storm.

- Stock up on non-perishable food and water.
- Make sure flashlights and battery-powered radios are working.
- Fill up your gas tank to keep your car's fuel line from freezing.
- Charge your cell phone.

It is very common to lose power during an ice storm. If you lose power, you should unplug your electronics to avoid damage from a power surge once the power comes back on. If your heating source requires electricity to function and the power goes out, dress in warm layers. Close doors to rooms that you are not using to keep heat in one area. Put towels or rags under the door of the room you are staying in to keep it warmer. Keep refrigerator and freezer doors closed to help keep the food cold. If you use an emergency heater, follow the instructions paying careful attention to proper ventilation.

## Preventing Frozen Pipes

Cold weather can cause serious plumbing problems if you don't take proper precautions. Pipes, whether plastic or copper, can burst if the water within them freezes, leading to very costly repairs.

When the temperature drops below freezing, you should protect indoor sink pipes that are against exterior walls by opening kitchen and bathroom cabinet doors to allow indoor heat to circulate. During severe cold temperatures, let the cold water drip from the faucet served by exposed pipes. Running water through the pipe – even at

a trickle – helps prevent pipes from freezing.

Keep the thermostat set to the same temperature both during the day and at night. By temporarily suspending the use of lower nighttime temperatures, you may incur a higher heating bill, but you can prevent a much more costly repair job if pipes freeze and burst.

If pipes freeze, use the master shut-off valve to cut the water flow to the building. The shut-off valve can be indoors or outdoors, usually in a basement, crawlspace or garage. Call a licensed plumber. Not all plumbing systems are the same. Attempting to thaw a frozen pipe without a professional plumber's help or advice can lead to serious damages that are very expensive to repair.

## Avoiding Winter Slips and Falls

With ice and snow comes slips and falls. The Centers for Disease Control and Prevention reports that about 1 million U.S. adults are injured due to slips and falls every year, with the injury rate increasing significantly as temperature decline. To decrease your risk of falling while walking on ice:

- Wear proper footwear. Footwear with rubber or neoprene composite soles provides better traction on ice and snow than leather or plastic.
- Take small steps. Small steps, almost side to side, help you maintain your center of gravity.
- Walk slowly. Be alert to the possibility that you could slip on an unseen patch of ice.
- Walk in designated areas. Avoid using shortcuts and self-made paths as these may be very icy and slippery.
- Many injuries occur when entering or exiting a vehicle. Be careful and hold onto your vehicle to help support yourself.
- Don't be distracted. Put your cell phone away while walking and focus on where you're going.

## Driving on Icy Roads

One of the most dangerous winter weather conditions for drivers is ice. In 2020, there were 374 fatal crashes, and an estimated 25,000 injury crashes that occurred in wintry conditions according to the National Highway Traffic Safety Administration.

When driving in wintry weather, slow down. It's harder to control or stop your vehicle on a slick or snow-covered surface. When on the road, increase your following distance enough so that you'll have plenty of time to stop for vehicles ahead of you.

As the outside temperature drops, so does tire inflation. Make sure each tire is filled to the vehicle manufacturer's recommended inflation pressure, which is in your owner's manual and on a label located on the driver's side door frame. It's best to check the tires when they're cold, meaning that they have not been driven on for at least three hours. Also inspect your tires at least once a month checking for any damage or conditions that may need attention. If you find tire damage, take your vehicle to a tire service professional.

## Winter Weather Warnings, Watches and Advisories

Winter weather related warnings, watches and advisories are issued by your local National Weather Service office. Here is what the weather alerts mean:

### Winter Storm Warnings: Take Action

Warnings are issued for a significant winter weather event including snow, ice, sleet or blowing snow or a combination of these hazards. Travel will become difficult or impossible in some situations. Delay your travel plans until conditions improve.

Ice Storm Warnings are usually issued for ice accumulation of around ¼ inch or more. This amount of ice accumulation will make travel dangerous or impossible and likely lead to snapped power lines and falling tree branches. Travel is strongly discouraged.

### Winter Storm Watches: Be Prepared

Watches are issued when conditions are favorable for a significant winter storm event (heavy sleet, heavy snow, ice storm, heavy snow and blowing snow or a combination of events.)

### Winter Weather Advisories: Be Aware

Advisories are issued when snow, blowing snow, ice, sleet, or a combination of these wintry elements is expected but conditions should not be hazardous enough to meeting warning criteria. Be prepared for winter driving conditions and possible travel difficulties.

For more information on how to protect yourself from winter weather, visit [USAFwellness.com](https://www.usafwellness.com) or contact your local Civilian Health Promotion Services team. Comprehensive information on cold weather safety can be found on the [Ready.gov website](https://www.ready.gov).



