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**INSTALLATION RESILIENCY:
LESSONS LEARNED FROM WINTER
STORM URI AND BEYOND**

HEARING

BEFORE THE

SUBCOMMITTEE ON READINESS

OF THE

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HOUSE OF REPRESENTATIVES

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INSTALLATION RESILIENCY: LESSONS LEARNED FROM WINTER STORM URI AND BEYOND

HOUSE OF REPRESENTATIVES,
COMMITTEE ON ARMED SERVICES,
SUBCOMMITTEE ON READINESS,
Washington, DC, Friday, March 26, 2021.

The subcommittee met, pursuant to call, at 3:01 p.m., via Webex, Hon. John Garamendi (chairman of the subcommittee) presiding.

OPENING STATEMENT OF HON. JOHN GARAMENDI, A REPRESENTATIVE FROM CALIFORNIA, CHAIRMAN, SUBCOMMITTEE ON READINESS

Mr. GARAMENDI. Good afternoon, all. I call to order this hearing of the Readiness Subcommittee. And if you are not speaking, please turn off your microphones.

First, some of the administrative and technical notes that we are required to do.

Members are reminded that they must be visible onscreen within the software platform for the purposes of identification. Members must continue to use the software platform's video function while attending the hearing unless they experience connectivity issues or other technical problems that render the member unable to fully participate on camera. If you experience technical difficulties, please contact the committee staff.

When you are recognized, the video will be broadcast via television and internet feeds. You will be recognized as normal for questions. There is a gavel sheet, and we will discuss that in a few moments. But, if you want to speak at any other time, you must seek recognition verbally.

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Be advised that I have designated a committee staff member to mute unrecognized members' microphones if necessary. So we have the control.

Please use the platform's chat feature to communicate with staff regarding technical or logistic support issues.

Finally, there is a 5-minute countdown clock on the software platform. Keep your eyes on it. If necessary, I will remind you when your time is up.

So are we all clear on the details? Very good.

Now I would like to make a few opening remarks.

Today's witnesses are the global integrators for their services' installation enterprises. They oversee the strategic and long-term planning for our installations, ensure the sustainment of existing infrastructure, and advocate for how future investments should be prioritized. They implement and operationalize the changes to law that we have passed in the NDAA's [National Defense Authorization Acts].

Our committee, in the last four NDAA's, has explicitly instructed the Department of Defense, and, therefore, each of the presenters today, to address energy conservation and base energy resiliency. In the two most recent NDAA's, we have instructed the DOD [Department of Defense] to plan and prepare for extreme weather events and sea level rise caused by climate change.

Generals, you are responsible for making our installations resilient to the hazards they face. These hazards include disruptions to utilities from natural and manmade sources, water scarcity, strong hurricanes on our coasts, tornados, droughts in the West, earthquakes, and flooding along our coast. Actually, I wrote that, but droughts also occur in the East—for example, Georgia, Alabama, and even South Carolina.

Two years ago, Camp Lejeune and Tyndall Air Force Base were devastated by Hurricanes Florence and Michael. When I asked the service leaders how we could avoid the \$5 billion damage in the infrastructure to just those two bases, I was told repeatedly that the answer is very simple: The buildings that were well-maintained and had been renovated to today's building standards were more resilient and in many cases not damaged by the storms. Those that were not updated, they were damaged.

And so the services knew the solutions. But, for years, the services have taken considerable risk in the installation portfolio, deferring necessary maintenance and upgrades on existing buildings in order to fund new platforms and systems.

Well, the bill has finally come due, not only in North Carolina and Florida with those two bases, but in California, where China Lake sustained \$1.1 billion in earthquake damage, much of which is, again, attributed to deferred maintenance and sustainment, and, most recently, Texas and Oklahoma during Winter Storm Uri, where under-maintained roofs, facilities, pipes, and HVAC [heating, ventilation, and air-conditioning] systems contributed to preventable damage to the military infrastructure.

The phenomenon of deferred maintenance is not new, nor is it specific to any particular administration. It is a chronic issue. We see it across the entire Readiness Subcommittee's jurisdiction. The services consistently fail to fund and sustainment in favor—I am going to read that again. The services consistently fail to fund sustainment in favor of new platforms and their support infrastructure. It is high time that we start learning and applying the lessons from these events, which we must now consider as normal.

Given the range of threats to our installations, the best way to make sound, cost-effective decisions is master planning. By getting a holistic view of both the threats to resiliency and the current condition of the installations, the services can make informed decisions that guide their investment priorities. And then, with that information, we can do our job in providing the necessary authority and money.

I look forward to this hearing and how the services are implementing the fiscal year 2020 NDAA requirement to conduct resiliency-informed master planning, especially at installations identified as being most at risk.

Finally, our installations are not islands unto themselves. If Winter Storm Uri taught us anything, it is that resiliency challenges faced by the surrounding communities will impact the installations and the ability of the bases' tenants to accomplish critical missions. The services must think of resiliency as a problem that extends beyond the fence line as they consider investments to improve energy, water, and extreme-weather resiliency at our installations.

With that in mind, Mr. Wilson, you are covering for our ranking member, Congressman Doug Lamborn, today. You know this game; you were the chairman of this. Delighted you are with us. The platform is yours. Mr. Wilson.

**STATEMENT OF HON. JOE WILSON, A REPRESENTATIVE FROM
SOUTH CAROLINA, SUBCOMMITTEE ON READINESS**

Mr. WILSON. And thank you, Chairman John Garamendi. Thank you very much.

Today, we will hear testimony from the Air Force, Army, Navy, and Marine Corps installation commands about lessons learned from the Winter Storm Uri and various other recent extreme weather events as well as the implementation of resiliency measures from the past four National Defense Authorization Acts.

Domestic military installations are critical to our military readiness. They house the training, mission execution, and sustainment operations and serve as a home to our service men and women and their families.

Over the past several years, extreme weather events such as severe flooding in the Midwest, hurricanes in the gulf and east coast, and crippling winter storms, have exposed vulnerabilities in our installations.

I gratefully represent the U.S. Army's Fort Jackson, which is currently refortifying its infrastructure after the thousand-year flood of 2015, which caused Simms Lake Dam to fail.

Existing vulnerabilities include outdated and unprepared infrastructure, concerns about energy resilience and dependence on commercial grids, and access to clean water. Each has the potential to undermine everyday activities at our installations and, ultimately, the critical work of our armed services.

In February, Winter Storm Uri wreaked havoc across the United States, highlighting weather-related threats to our bases and yielding important lessons. Thankfully, installations such as Offutt Air Force Base, headquarters of U.S. Strategic Command, demonstrated their resilience during the storm by disconnecting the base from the commercial power grid and operating off the two power

plants on site with no disruption to operations. Other installations did not fare so well, experiencing prolonged power and water loss.

Over the years, Congress and DOD have looked to prioritize the investments in resilience projects and better manage risk posed by extreme weather. I look forward to hearing today how the services are implementing provisions to strengthen our installations.

Better planning is a key to the process. So-called black-start tests have been employed to test the reliability of existing backup power and identify areas that require additional resiliency measures. Black starts have underscored the importance of microgridding or islanding, which generally means that an installation can maintain power when one or more of the connected power sources experience an outage or are not currently generating power. This, along with other energy-resilient mechanisms, is worth further exploring.

The military services have accepted risk in their installation portfolios for years. The cost of that risk is now apparent. The estimated recovery costs of Hurricanes Michael and Florence in the military construction accounts alone were over \$4 billion. These services can do better to assess risk and vulnerabilities at their installations to sustain the installation operation and save taxpayer dollars in the wake of the events.

Sensible, cost-effective investments will be the key to mitigating future risk. Better facility, energy, and water resilience is directly tied to the safety and security of our installations. We can do better as a nation to understand, plan for, and mitigate the posed threats as we have seen with the incredible winter storms.

I want to thank the witnesses for their engagement today in this important topic, and I look forward to hearing about how your service is taking action.

Thank you, Mr. Chairman, and I yield back.

Mr. GARAMENDI. Thank you, Mr. Wilson.

Before I introduce the witnesses today, it occurred to me that Pogo may have had it correct: We have seen the enemy, and it is us. It is, in fact, the Armed Services Committee and the Appropriations Committee that have shortchanged the funding necessary to build the resiliency into our bases. It is my intent that this committee will do everything it can to change that pattern of rather sad history.

So, with that good news, maybe, if we could pull it off, I am going to introduce our witnesses one at a time.

I am going to start with the U.S. Army: Lieutenant General Douglas Gabram, Commanding General, Army Installation Management Command. And the rest of his title and where he is is just above his head there: U.S. Army Military Command, Installation Management Command Headquarters, Fort Sam Houston, Texas.

General, why don't you get us started?

STATEMENT OF LTG DOUGLAS M. GABRAM, USA, COMMANDING GENERAL, ARMY INSTALLATION MANAGEMENT COMMAND, DEPARTMENT OF THE ARMY

General GABRAM. Well, Chairman Garamendi, good afternoon—Congressman Wilson and distinguished members of the Subcommittee on Readiness. Thank you for this opportunity to testify about Army installation resilience.

I have been fortunate and honored to serve almost 37 years. My wife of 34 years is a former Army nurse and now on the front lines of COVID here in San Antonio. Our son is in Officer Candidate School at Fort Benning, Georgia. Eighteen PCS [permanent change of station], moved multiple deployments. We lived and raised our children on military installations.

So why do I tell you this? Because our service is a family affair, like many of yours. Installation readiness and resilience is very personal to me.

So I look forward to updating you on the Army's efforts to mitigate and repair facilities impacted by Winter Storm Uri as well as the strides we are taking to improve resiliency across our installations for the short and long term.

So, on behalf of Acting Secretary Whitley and Chief of Staff of the Army General McConville, I can assure you the Army takes very seriously the threats that climate change poses to our installations and facilities.

Just last month, in February, we experienced unprecedented conditions that shattered historical low temperature records for consecutive days. Winter Storm Uri hit us hard. In total, 694 facilities, including some barracks, and 1,366 privatized homes across 4 installations—Fort Hood, Fort Sill, Fort Polk, and Fort Riley—were damaged in some manner.

Of the privatized homes impacted, 145 experienced enough damage for us to temporarily displace those residents. And with exceptional assistance from our privatized housing partners, we are on track to get all the remaining families back into their homes within 2 weeks.

So our planning and preventive measures saved time and money, protected our force, and maintained mission readiness. Our contingency training, along with local first responders and service providers, paid off for quick response times.

We also validated that our aging facilities and systems failed first and suffered the most damage. Over time, our infrastructure has felt the effects of high use and limited funding. Army senior leaders recognize this, and we are taking decisive steps to improve our facilities, especially barracks. With continued support from Congress, the Army will continue to modernize our facilities to increase resilience, as outlined in the new Army Installation Strategy.

Now I would like to highlight the Army Installation Energy and Water Strategic Plan. The Army will integrate energy and water considerations across the enterprise by focusing on three strategic goals: resilience, efficiency, and affordability.

It is Army policy right now that our commanders will consider the impacts of changing climate and extreme weather into all infrastructure plans, policies, and procedures. For example, the installation master planning will accomplish this by using the Army's Climate Assessment Tool and the Army Climate Resilience Handbook to inform the planning process.

Installations are also preparing energy and water plans to identify ways to improve efficiency and strengthen the resiliency of our electrical and water systems. All Army installations are scheduled to complete these plans by the end of fiscal year 2022.

And to implement these plans, the Army will continue to aggressively pursue energy savings performance contracts. We have 99 of these already in place, and we are looking to expand. Together, these measures helped contribute to a 20 percent reduction in energy consumption over the last decade.

We are also actively pursuing increased MILCON [military construction] funding under DOD's Energy Resilience and Conservation Investment Program.

In summary, through proactive planning, collaborative engagement among multiple stakeholders, and leadership by our garrison and senior commanders, we were able to act decisively to keep our soldiers and families safe during this winter storm.

We are committed to improve the resilience of our installations, ensuring they are aligned with Army policy, the Army Installation Strategy, and the Army Installation Energy and Water Strategic Plan to optimize our long-term investments.

Chairman Garamendi, Congressman Wilson, thanks for the opportunity to testify before you today. I look forward to further dialogue in this important matter. And thanks for your continued support of the Army soldiers, families, civilians, retirees, and veterans. I really look forward to your questions.

Thank you.

[The prepared statement of General Gabram can be found in the Appendix on page 33.]

Mr. GARAMENDI. [Off mic.]

VOICE. Chairman, you are muted.

Mr. GARAMENDI [continuing]. Commander of Navy Installations.

**STATEMENT OF VADM YANCY B. LINDSEY, USN, COMMANDER,
NAVY INSTALLATIONS COMMAND, DEPARTMENT OF THE
NAVY**

Admiral LINDSEY. All right, Chairman Garamendi, I think that was my cue. So, Chairman Garamendi, Congressman Wilson, and distinguished members of the subcommittee, thank you for this opportunity to testify today on the resilience of Navy installations.

Our Navy's 70 installations worldwide provide the platform from which the United States develops, generates, projects, and sustains naval power. The capability and capacity of our installations to resist, adapt, and recover from crisis or disaster, whether natural or manmade, is fundamental to installation mission execution and support of the fleet, the fighter, and the family.

We have what I believe is a strong record of considering, incorporating, and executing resiliency into all aspects of installation operations, to include infrastructure, facility and utilities planning, design, construction, and repair, often in cooperation and coordination with the State, county, and local communities' utility providers, et cetera.

As a former installation commanding officer, a three-time region commander, and today as Commander of Navy Installations Command, resiliency has been and continues to be critical to mission execution and mission success.

Also fundamental to execution and success are vibrant, productive, informal and formal relationships with State and local governments, other Federal and public agencies, and private entities.

These partnerships are absolutely critical to the continued success of our resilience initiatives.

Many of our resiliency efforts and successes can be traced back to authorities and/or resourcing provided by Congress which allow us to seek out and take advantage of resiliency-building opportunities, both within Navy lifelines but also in conjunction with other non-Navy organizations and entities.

I look forward to continuing to work with Congress and this subcommittee to build upon our success and seek out clever and creative solutions to address Navy installation resiliency and the effects of our changing climate.

Thank you for the opportunity to appear today, and I look forward to your questions. Thank you.

[The prepared statement of Admiral Lindsey can be found in the Appendix on page 40.]

Mr. GARAMENDI. Admiral, thank you very much.

I now turn to the Marine Corps: General Banta, Marine Corps Installations Command.

General.

STATEMENT OF MAJGEN EDWARD D. BANTA, USMC, COMMANDER, MARINE CORPS INSTALLATIONS COMMAND, UNITED STATES MARINE CORPS HEADQUARTERS

General BANTA. Good afternoon, Chairman Garamendi, Congressman Wilson, and distinguished members of this subcommittee. Thanks for the invitation and opportunity to address the committee today on installation resiliency, which is critical to our ability to train forces and maintain readiness.

I also wanted to thank Congress for your support to the Marine Corps Hurricane Florence recovery efforts. Thanks to your strong support, we are making substantial progress in rebuilding Marine Corps Base Camp Lejeune and our air stations at Cherry Point and New River.

As part of this effort, we are incorporating significant improvements to our facilities that will ultimately result in more resilient bases. We have also initiated resiliency initiatives across our installations, such as the ongoing master planning effort at MCRD [Marine Corps Recruit Depot] Parris Island. That will help mitigate the effects of myriad threats.

To that point, when we think of resiliency, we consider our installations' ability to anticipate, prepare for, adapt to, and recover from a wide spectrum of threats to our operational readiness, to include the effects of climate change. So, in that sense, installation resiliency is fundamental to enabling the operational readiness and warfighting capability of our Fleet Marine Forces and the joint force.

And we know our installations are vulnerable targets for a growing host of sophisticated kinetic and nonkinetic threats, but also to environmental factors that threaten our ability to generate readiness and deploy and recover forces from our bases and stations.

Recent events such as Winter Storm Uri, drastic changes to weather patterns, rising sea levels, natural disasters, COVID-19, insider threats—all of this underscores this point. Climate-related effects like wildfire and droughts routinely threaten our west coast

installations. Hurricanes and typhoons are a staple for our east coast and Pacific bases. And the prospect of rising sea levels directly affects all of our coastal installations, with our recruit depot at Parris Island as a prime example.

I would like to take a moment to speak to the nexus between our efforts to develop our future force and opportunities to improve the resiliency of our installations. Our Commandant has initiated a comprehensive force design effort that will fundamentally reshape aspects of our future force, and we anticipate evolving our installations accordingly.

As we work with our force planners, who are actively experimenting with force design initiatives, we seek to refine and understand our future installation requirements and identify opportunities to improve our resiliency in the process. Examples include building upon investments in smart grids and microgrid technologies, incorporating the effects of climate change into all of our installation master plans, and designing and building our new infrastructure to maximize energy and water efficiency.

As Hurricane Florence demonstrated at Camp Lejeune, our new assets and infrastructure built with updated construction standards were significantly more resilient to the storm's effects than our older facilities. We really appreciate the committee's support as we recover from the hurricane's damage. And that has resulted in rebuilding out of flood plains, applying updated standards for construction and repairs.

And while we are incorporating vulnerability assessments and evaluations into our master planning process, we recognize we still have work to do.

We also recognize the interdependencies between our installations and the surrounding and supporting communities. In short, we must look beyond our fence line and plan with our local partners.

For example, Marine Corps Air Station Cherry Point's living shoreline, a Readiness and Environmental Protection Integration challenge submitted by the North Carolina Department of Agriculture, is creating a living shoreline to mitigate erosion along the Neuse River.

Additionally, MCICOM [Marine Corps Installation Command] recently completed the Climate Change and Adaptation Resiliency Study to identify potential hazards and mitigation costs for MCRD Parris Island. Building upon this momentum, Parris Island and Beaufort recently partnered with the Lowcountry Council of Governments, the city of Beaufort, and the town of Port Royal to continue this resiliency planning work.

We look forward to more opportunities to address similar issues in coordination with Federal, State, and local partners.

We are working to improve the resiliency of our installations' critical functions, such as the power grid, water distribution, and communications capabilities. Over the last few years, MCICOM has leveraged third-party financing/leasing mechanisms, Energy Resilience and Conservation Investment Program [ERCIP], and FSRM [Facilities Sustainment, Restoration, and Modernization] funding to deliver clean energy while increasing the resilience of utilities infrastructure in support of critical missions.

An example of this is Marine Corps Logistics Base Albany, which will become the first Marine Corps net-zero installation this April, next month. This significant energy achievement will produce as much electricity from renewable green-energy sources as it consumes from the surrounding community utility providers.

So, in closing, the Marine Corps continues to learn from past events and seeks new solutions to shore up our coastlines, modernize our bases' infrastructure, and increase our ability to recover from extreme weather events. We have to be agile enough to adapt to the effects of drastic changes in the environment and reinforce the foundations of our installations' resiliency.

Thank you once again for the opportunity to appear before you this afternoon and for your leadership in addressing today's climate-related changes. I look forward to your questions.

[The prepared statement of General Banta can be found in the Appendix on page 49.]

Mr. GARAMENDI. General, thank you very much.

I now turn to General Allen, Commander of the Air Force Civil Engineering Center.

General Allen.

STATEMENT OF BRIG GEN JOHN J. ALLEN, JR., USAF, COMMANDER, AIR FORCE CIVIL ENGINEERING CENTER, AIR FORCE MATERIEL COMMAND, DEPARTMENT OF THE AIR FORCE

General ALLEN. Good afternoon, Chairman Garamendi, Congressman Wilson, and other distinguished members of the subcommittee. I am honored to appear before you today to discuss Air Force and Space Force installation resilience.

As you are well aware, natural disasters and severe weather have significantly impacted Air Force and Space Force installations over the last few years. We are aggressively moving forward with rebuild efforts at Tyndall Air Force Base and Offutt Air Force Base in Nebraska and are continuing to assess damage and recover from recent winter storms that impacted large portions of the United States.

It is of utmost importance to us that we ensure our installations are ready and resilient. Our installations are the platforms from which we build, deploy, and employ readiness and combat power. All Air Force and Space Force missions start and end on an installation. Just as importantly, they are home to thousands of airmen, guardians, and their families.

In recent years, Congress has included numerous provisions in legislation to enhance installation resilience, and the Department of the Air Force is working to implement them.

We have developed a Severe Weather and Climate Screening Risk Assessment Playbook, which we have used to conduct initial assessments of exposure and risk due to severe weather and climate hazards at all major installations. The results will be used to develop installation resilience component plans to be included in each installation development plan, as required by the fiscal year 2020 NDAA.

Additionally, we have completed installation energy plans for 24 installations and plan to have another 20 complete by the end of this fiscal year.

We have also conducted energy resilience and readiness exercises at Vandenberg Air Force Base in California, Hanscom Air Force Base in Massachusetts, and Joint Base McGuire-Dix-Lakehurst in New Jersey. We have two more planned, at Wright-Patterson Air Force Base in Ohio and Eielson Air Force Base in Alaska, for this year. And in future years, we expect to complete at least five per year, as required by the fiscal year 2021 National Defense Authorization Act.

Finally, I would like to mention the recent winter storms and extreme cold that impacted a large portion of the United States. Twenty-eight Department of the Air Force installations were impacted to some extent. We are continuing to assess damage and are committed to restoring facilities to full mission capability.

The majority of the damage was the result of burst water and fire-suppression lines due to freezing. Our personnel repaired our installations admirably, but numerous factors, including sustained periods of extreme cold, degraded facilities and infrastructure condition, and off-base power and water supply issues, led to damage and temporary interruptions.

As we remain steadfast in our resolve to provide credible combat capability to the joint force and for our Nation, the Department of the Air Force is committed to continuing to work with this subcommittee and the rest of Congress to ensure our installations are ready and resilient.

Thank you for the opportunity to testify today, and I look forward to answering your questions.

[The prepared statement of General Allen can be found in the Appendix on page 58.]

Mr. GARAMENDI. Thank you very much, General Allen.

For all of the witnesses, we thank you for your presentation.

I am going to read the gavel list here, and we will modify as people come and go: Garamendi, Wilson, Courtney, Scott, Crow. If other members want to participate, please raise your hand, and the staff will get you in the gavel list.

Please be aware that—Kai wants to be on—that people exit and return to the hearing, and the gavel list is somewhat flexible, resulting in that. Mr. Johnson also would like to participate.

Okay. So, I get to start.

Here is where I want to start with this. This is going to be a long-term process in which this subcommittee will carry on the work of the previous years and really try to enhance the opportunities for the military services to address the infrastructure needs on the various facilities.

It is a process that is going to require interaction between the presenters today and the men and women that follow them in these positions. That interaction has to be more than the President's budget. It has to be an interaction that begins with sharing of information early into the process.

General Gabram, you indicated that the Army will complete its work on the assessment of the infrastructure resiliency in the end of the 2022 fiscal year. The other witnesses indicated that they

have work in process on this. I don't want to wait until it is over. I want to work with you as you proceed, so that we can get ahead of the problem, ahead of the programs.

And so I would ask each of you to briefly describe how we might be able to interact as you work towards completion of the required resiliency plans so that we can take advantage of this year's NDAA and build into it money, MILCON, get ahead of the problems. Those installations that are critical and need immediate attention, we don't want you to wait and we don't want to wait either.

So let's start with—I am going to go in reverse order here. We will start with the Air Force and then work back and end up with the Army.

General Allen.

General ALLEN. Thank you, Mr. Chairman.

I think, for the Air Force at least, we have enjoyed a really good working relationship with your staff. I saw that firsthand play out when we were dealing with the aftermath of Hurricane Michael and its impacts on Tyndall and then the subsequent storm event we had up in the Midwest that affected Offutt in Nebraska.

You know, maybe a better example is a lot of the language that you all have put in to this effect starting back in 2018. I felt like we had a good conversation going with your staff, and so that language was actually quite helpful to the things we are trying to do.

And I guess what I would say is, we are happy to be there in Washington or wherever you would like us to share the results of what we are seeing as we go out and do climate risk assessments at each of our installations, which are the first step in building those resiliency plans, which are part of our installation development plans. We have a lot of information we can share now already with our installation energy plans.

You know, we go to an installation, we do the initial step of the planning, which is focusing on risk assessments and gaps and seams that we need to close. And a lot of those solutions involve leveraging private-sector capital. And I think having you involved with what we are seeing there and what our ideas are coming out of there can be very helpful. Sometimes those kinds of initiatives might require legislative help to get across the finish line.

So I guess I would boil it down to say, I am really pleased with the relationship that we have already in this job and in my last job when I was there in the Pentagon. I think that is very helpful, and we would like to see that continue.

Does that help, sir?

Mr. GARAMENDI. It is a starting point. What I am looking at here is an interactive period of—well, for the future, so that we interact as we go forward. The NDAA is probably, at least our version, is 3 or 4 months out, probably 3. And if we are going to build anything into it, we need to be on that task now, as you work to complete.

General Banta.

General BANTA. Chairman Garamendi, thanks for the opportunity to comment here.

Following up on what General Allen said, I think we have a very good relationship with the staff members, in particular, there with Congress and in this subcommittee, and that probably provides a

pretty good opportunity for continued and regular engagement as we progress with our resiliency plans.

You know, I talked a little bit about what we had done thus far. And we have a completed resiliency plan down for Parris Island, Marine Corps Recruit Depot Parris Island. And we have several installation energy security plans that are completed, with several—two actually completed, with three more coming online in the next couple months.

So we have a lot of data now that we can share. Clearly, we have more to do and to stay on trajectory in order to meet the requirements from the NDAA. But we are happy to share that information in whatever forums or venues are most productive to ensure that we are updating Congress and your subcommittee as needed.

And I will pause there, sir. Over.

Mr. GARAMENDI. Thank you, General.

Admiral Lindsey.

Admiral LINDSEY. Chair Garamendi, thank you.

I think, as far as interactive and making sure that you and the subcommittee is aware and up to speed, so to speak, on what we have in the hopper, providing regular updates on the projects that we have currently underway that talk to installation resiliency and climate change, whether it is energy, other utilities.

And then, obviously, as soon as the NDAA is released, obviously, provide you an update for those projects as well, and providing some kind of regular drumbeat to your staff and the subcommittee staff so you can see what we are working on, where we are working on it, and how those support resiliency and climate change and other efforts in that area, sir.

So I think, at least from my perspective, we are happy to do that, and I think that might be helpful in assuring that you know what we are doing, where, and how it feeds into this important topic.

Over.

Mr. GARAMENDI. Thank you, Admiral.

General Gabram. I mispronounced your name, General. Forgive me. "Gabram."

General GABRAM. "Gabram." Yes, sir. That is okay. My dad knew it was going to be an issue.

Just to add to my comrades, I mean, sir, we are available at any time. We have 30 for the Army right now that are at or near completion that we could share; 11 are final, 16 are in final review.

We are also partnering with the Pacific Northwest Lab to assist in helping us put a strategy and the implementation plan for those plans—to put them into action. And there are several other areas, such as the Office of Initiatives Projects [OIP] and even the Energy Resilience and Conservation Improvement Plans.

So I think the lateral communication between the services is pretty good, but we look forward to sharing whatever battle rhythm or drumbeat that you would like to set up.

Thank you.

Mr. GARAMENDI. "Battle rhythm and drumbeat."

Well, I said it; I am going to say it again: We are going to write a new NDAA. And the lessons—well, let's just say, the climate and the geology have given us a heads-up. And a lot of the MILCON

that is currently stacked up for the next years may or may not address these resiliency issues.

And so what I want to try to—not try to—what I want to do and will make every effort to achieve is to look at what is critical so that the sustainment of the facilities is in better probability.

And, therefore, for each of you, I would like to know where you are in assessing the most dangerous, the most critical risk at the most critical bases, so that we can deal with that as we rack and stack our own assessment of military construction as well as other programs that we would like—that you need to have done sooner than later.

So that is the whole point of this exercise. And, yes, thank you very much for working closely with the staff on all of these things. We are going to ramp it up. I don't want to wait 2 years to get to the most critical issues on the resiliency side.

Mr. Wilson, I am going to turn this over to you.

Mr. WILSON. Thank you, Chairman Garamendi. I appreciate it.

And for our panelists today, what an honor to be with you, and we appreciate your dedication and service.

And, in particular, General Banta, I want to thank you for your recognition of Parris Island, what extraordinary facilities there are there and how historic they are. I previously represented Parris Island, and so it was really so heartwarming to learn the history of it, that, in fact, the first Spanish settlement on the east coast of the United States was there in 1566. And then, of course, for over 100 years, it has now been a Marine training facility. So 600 years of appreciation.

And then I am really looking forward—next month, I will be next door at Hilton Head Island for the Heritage Golf Classic. So those of us who grew up in the Lowcountry of South Carolina are so proud and grateful for the success of Parris Island.

With that, a question for General Gabram, and that is: I was grateful to hear of the success of the energy savings performance contracts. We have those at different facilities in South Carolina, and they have been remarkably successful.

Military installation resilience has been defined as the ability of an installation to avoid, prepare for, and minimize the effect or adapt to and recover from extreme weather events or changes in environmental conditions. This does not include other important considerations, like internet connectivity and security, adaptive design that accommodates multiple tenants and missions, and enabling infrastructure.

What is the Army's concept of installation resiliency? And how is that postured to meet the additional considerations?

General GABRAM. Chairman, I would first thank you. And I would like to—it kind of starts with our Strategic Energy and Water Plan, and then it really goes around three goals. And I will start wide and kind of hone it down a little bit.

So the three, it is made up of resilience, which the simple definition is ensure energy and water for critical missions under all conditions, sort of to your point; efficiency; and affordability. Those are the three objectives we look at within the strategic plan.

To your point about energy savings performance contracts, sir, we are all in. And, since 2010, we have awarded approximately

\$1.8 billion worth of these contracts. And right now we have 99 in execution, and we are looking to do a lot more.

So we completely understand the capability that these could bring in terms of resilience and efficiency and affordability. And we are working to take a look through the energy and water plans—because that covers that risk assessment in that plan—and then where and when we can go with or look to a savings performance contract.

Thank you.

Mr. WILSON. And, General Gabram, you have extraordinary people representing you on the Hill, and if they could provide to us the examples of energy savings performance contracts, I—that has just been such a positive story for our country.

General Allen, do you have any experience employing nontraditional funding streams to address the resiliency issue, such as public-private partnerships, enhanced-use leases, or other innovative financing, to help supplement the traditional MILCON and facilities maintenance process?

Additionally, is there any consideration of secure micro-reactors, small modular reactors, on a secure post, such as Offutt or possibly Andersen Air Force Base in Guam?

Mr. GARAMENDI. General Allen, you are muted.

General ALLEN. Can you hear me now?

Mr. WILSON. Yes.

General ALLEN. Sorry about that. Congressman Wilson, thank you.

I would like to think of energy savings performance contracts and utility energy service contracts as nontraditional. I think we have been doing them for a little while, so maybe they are in the traditional category now. But they have been very powerful tools for us. And, going back about 5 years, we have been able to leverage about \$750 million in private capital that we then pay back through energy savings. So that is great.

The other things that we have had some success in and I think are really going to help guide our path forward in this are energy assurance leases and then enhanced-use leases, where, in both cases, we are taking underutilized land on an installation, partnering with the public or private sector for them to come in and set up some—in the case of energy assurance leases, some sort of energy generation that then provides energy resiliency back to the installation.

We have 130 megawatts of potential generation in work now with EALs, energy assurance leases, that we are looking at across five installations. And so, when you start to do that math, it is not quite perfect yet, but when you are talking about that kind of generation, you are getting close to being able to island your installation off the grid if you need to.

And on the enhanced-use lease, I was just out at Edwards Air Force Base in California and got to see what is starting to come out of the ground, what will be the largest PV array in the country, photovoltaic array in the country. It is out on the western edge of Edwards. That is an enhanced-use lease. It is going to put 800 megawatts of power into the California grid, green power—a big deal.

Our benefit there, our fair market value that we get out of that, has a potential to be about \$2 million a year that then we can put into energy-resiliency initiatives at Edwards and other places around the Air Force.

So, you know, particularly out West, but a lot of our installations have that untapped potential, I would say. And we are only getting better at doing these things. And a lot of where we are heading in the Air Force is going to involve those kinds of tools.

Did that answer your question, sir?

Mr. WILSON. It does. But I hope you will look into small modular reactors too, in a secure position, like on Offutt or Guam. And you can get back with me later on that. Congratulations on your success.

A final question for Admiral Lindsey. To what extent have climate conditions or extreme weather events resulted in shifting missions from particular installations to others in order to reduce infrastructure vulnerabilities? And what has been the impact of the adjustments?

Admiral LINDSEY. Thank you for the question.

Shift in—none of the missions, I don't believe, that I can think of that we have actually shifted. We have obviously had to do repairs and continue to weave climate change and resiliency efforts into those installations that are in the face of natural disasters or subject to hurricanes or earthquakes. But as we do those, we do those—as we construct those facilities, as we modernize them, as we renovate them, we weave improved building codes and criteria so that they are more resilient to the natural disasters that they may be subject to in the future.

But I can't think of specifically any missions that have been permanently shifted as a result of climate change or sea level rise.

Over.

Mr. WILSON. Well, thank you very much. And, as I conclude, I grew up in the "Holy City" of Charleston with the Charleston Navy Base. And so—and I was a Sea Cadet, all right? So I really appreciate your service.

I yield back.

Mr. GARAMENDI. Thank you very much, Mr. Wilson.

There has been a change in the gavel order. I think Mr. Courtney has stepped out. If and when he returns, we will put him back in. And, therefore, the gavel order is Crow, followed by Scott. And I believe there are three others that have offered to join in. I will give you that information when Mr. Crow finishes his questions.

You have 5 minutes, Mr. Crow.

Mr. CROW. Yeah. Thank you, Mr. Chairman.

Thank you to all the witnesses as well. This is a very interesting topic, one that I have spent a lot of time looking at.

My first question goes to a bill that I had in the fiscal year 2020 NDAA called the Military Installation Resilience Assuredness Act, the MIRA Act, which actually requires all major military installations to integrate into their master plan on a rolling basis an assessment of resiliency, climate effects, extreme weather, and the like.

It is my understanding now, 18 months after we passed that, that none of those assessments have been conducted or completed

at this point. So my first question is, have those been done or are they in the process of being done?

And then the second is, how does that work in with the renewed emphasis that the DOD has on climate? I forget which one of you said at the beginning that you are actually using now the Climate Assessment Tool and you expect that assessment to be completed at the end of fiscal year 2022.

So if you could explain to me the intersection of those two efforts, the status of the MIRA Act, and how you expect those to go forward, I would be very appreciative.

General GABRAM. General Gabram. I will start.

So I would say, we are in the process of executing, in reference to the MIRA Act.

The Army Climate Change Assessment Tool, for us, it is web-based. So it really is a predictive analysis tool of the climate vulnerability, right? It is like a risk assessment. It looks at drought, flooding, fire, tornados, hurricane, ice storms. And so we have about 117 installations assessed right now.

And then we also have—and this is just—that one came out in July of 2020, and our Climate Resilience Handbook came out in August of 2020. It is really a companion; it is a planner to the Climate Assessment Tool.

And that goes into and leads into our energy and water plans. And, as I said, we have 30 at or near completion, and I had said completed by 2022, but we are working—you know, we are working in stride. If we can get them done sooner, obviously we absolutely will do that.

So that is kind of how those two tools integrate or nest into the plan—

Mr. CROW. General, can you just tell me when you—do you know—and if you don't right now, that's fine, but if you can give me that information—when you expect the first of those master plan updates to occur, relative to the MIRA Act?

General GABRAM. I don't. Updates—to you, I do not, so, for the record, I will have to check that and get back.

But, in terms of what we are doing at the installation and below and then above, up to me, we are getting after what I just described.

[The information referred to was not available at the time of printing.]

Mr. CROW. Okay.

And then, secondly, with the remaining time we have here: Obviously, moving to microgrids and having to do the metering that we have to do, which obviously remains a big challenge within many of your installations—because I know we don't even have a firm grasp on the actual energy use itself at all of our installations because we don't have the meters in place.

Could you just briefly describe the importance of making sure that we have supply-chain integrity of our hardware so we are not sourcing those from places that are within the Chinese sphere of influence and we have integrity to the hardware that is in place to conduct this work?

General GABRAM. Yeah, I would—Congressman, I would—USACE [United States Army Corps of Engineers], our partners,

our Corps of Engineers, the acquisition process that we go through, we address it in those arenas. And, obviously, the threat there, as you described, is, you know—it is significant.

The metering program you mentioned, we are in the process of executing that. We have installed about 19,000 advanced meters at—I think it was 120 Enterprise Energy Data Reporting Systems in place. So we are in progress. We are not there yet, but we are working on it.

Over.

Mr. CROW. I appreciate that.

Just in the remaining time, I would just reiterate the need—obviously, this is an area of great importance to me—to make sure we are building this out, but at the same time, I didn't want us to put hardware into place in these microgrids that actually provide a backdoor for some of our main adversaries. So I think that is something we all have to look very hard at.

Thank you.

I yield back, Mr. Chairman.

Mr. GARAMENDI. Thank you, Mr. Crow.

Mr. Scott, you are next.

Mr. SCOTT. Thank you, Chairman.

General Gabram, I am told—and correct me if I am wrong—that Fort Hood's February electric bill was somewhere around \$30 million, and that is effectively the same amount of money that was spent for all of fiscal year 2020 for that base for energy. Is that correct?

General GABRAM. Congressman, the projected bill, you are correct, is approximately that, although we are in the process of challenging and taking a look at that, the accuracy. Because, as you know, you know, there are many folks in Texas that are looking at a higher bill than—

Mr. SCOTT. Sure.

General GABRAM [continuing]. They are actually going to turn out to be. But you are correct; it is in that neighborhood.

Mr. SCOTT. Okay. Are the other bases [inaudible] or is Fort Hood the primary one?

General GABRAM. Fort Hood is the primary one, Congressman.

Mr. SCOTT. Okay. And so did we have any other bases that ended up with similar changes in their billing for their power supply throughout other States?

General ALLEN. Congressman, this is General Allen for the Air Force.

Yes, to answer your question, some of our Air Force installations have gotten February utility bills that are higher than—abnormally high.

Over.

Mr. SCOTT. Okay. And are those installations in Texas, and, if not, which State are they in?

General ALLEN. They are in Texas.

Mr. SCOTT. Okay. I think that is something that we, as a committee, may want to look at.

And as we look at the new sources of energy—I know in Georgia we have the Marine Corps Logistics Base in Albany that is using alternative energy from a landfill and then at Robins Air Force

Base we have the solar panels. And I think this gets back to what Mr. Crow and, I think, Mr. Wilson were talking about a little bit.

You know, as we look at these new sources of energy, you know, the resilience of them and the dependability of them—I don't have as much faith in solar as I do some of the new technologies that we see out there. And I hope that you will continue to keep us more informed with the types of technology that you are pushing towards for the energy on our installations.

And, General Allen, I didn't see in the report where you talked about Air Force Materiel Command and—I am sorry—about our installations like Robins Air Force Base, the depots. How is DOD addressing facilities on our depots that are in degraded conditions at this stage?

General ALLEN. Thanks, Congressman. Well, our depots do resource themselves with their working capital fund. Certain of the facilities, particularly those that are generating the service that they provide, some of that facility sustainment is covered with working capital fund. But they are primarily reliant on the O&M [operations and maintenance] that we program every year, just like we do for all of our installations. And our infrastructure investment strategy that was published 2 years ago is our path by which we are trying to improve that.

In a nutshell, we are trying to resource at a minimum of 2 percent of our plant replacement value each year, which we believe is the minimum level that we need to sustain, effectively, to realize the design life of our built infrastructure. Does that help?

Mr. SCOTT. It is a good answer. And thank you for that. One final question, and I will turn it over to other people. How much of the resiliency plan has to do with demolition and getting rid of old buildings in the inventory on all of our bases, whether they be depots or more traditional bases that are not energy efficient; how much demolition are we looking at where we can get rid of some of these buildings and the payback is pretty short-term?

General ALLEN. Sir, General Allen, again. Our investment strategy targets a 5 percent reduction through demolition, and that is fairly modest. But that is a good start. Because, absolutely, we need to reduce the amount of built infrastructure that we have so that the money we are able to program is, you know, it goes further, frankly.

Mr. SCOTT. All right. Thank you, gentlemen, and I will yield the remaining 20 seconds.

Mr. GARAMENDI. Very good. And the next two will be Mr. Kahele and Mr. Johnson. So guys, you are up.

Mr. KAHELE. Yes, sir. Mahalo, Chair, and aloha to my colleagues and to our panelists today. Aloha from Hawaii. My question is for Admiral Lindsey. So I am out here in Hawaii, as you are well aware. You know, Hawaii is critical to our National Defense Strategy as outlined by the INDOPACOM [U.S. Indo-Pacific Command] commander.

And my question to you, sir, is in regards to the Barking Sands Tactical Underwater Range, which is a critical part of PMRF, the Pacific Missile Range Facility, on the island of Kauai. This location and the range is very unique; it is strategic; it plays an essential role in realistic training operations, especially for our submarine

warfare fleet and their fleet engagements in the Pacific theater of operations. The range allows training, tactical development. And really, it is a premier facility for crew certification and training enhancing for critical readiness of the Pacific Fleet.

Right now, sir, roughly, 30 percent of the Barking Sands Tactical Underwater Range and its in-water sensors, which, as I understand, 12 of the 42 in-water sensors are inoperable due to the aging infrastructure. And as you all know, sir, with climate change and major hurricanes that come through the Hawaiian Islands, or at least near the Hawaiian Islands, every hurricane cycle, which is in the summer, we are just one bad storm away from additional sensors being compromised.

So given this serious threat to the readiness of our submarine fleet, will the United States Navy prioritize and accelerate funding towards underwater communications infrastructure projects that will prevent the potential loss of these undersea warfare training sensors and capabilities, such as mine warfare and underwater communications and splash detection? Over.

Admiral LINDSEY. Thank you, Congressman. Thank you for highlighting the importance [of that] facility and that installation in Kauai. I had the opportunity to visit that here in the past, and it is a unique and critical asset, one that we need to continue to work on to improve its resiliency and its ability to do its mission. In fact, that is one of the locations that we are pursuing energy resiliency projects to make sure that it can continue to do its mission under adverse situations.

The range you talk about, sir, unfortunately, doesn't fall underneath my purview, the equipment or the operation of the range, but I am happy to take that question, if you will allow me, for the record, and get back to you on a better answer to the operation of the range and the equipment associated with it. It just doesn't fall underneath my responsibility, maybe Installations can help. So I apologize for not being able to specifically answer your question. But if I can take it for the record, I would be happy to get back to you on it.

Mr. KAHELE. Yeah, sounds good, sounds good, Admiral. And I will be out there in few weeks, so I will have a chance to meet with the base commander, the captain out there at PMRF. So thank you so much, and I appreciate you helping run down an answer for that. Thank you. I yield, Chair. Thank you so much.

[The information referred to was not available at the time of printing.]

Mr. GARAMENDI. Mr. Kahele, thank you for the question. The next is Mr. Johnson.

Mr. JOHNSON. Thank you, Mr. Chairman, and I feel like I should apologize to the generals for being underdressed for today's hearing, but we are all multitasking at home, so we appreciate your indulgence on that.

Question for General Allen. In the aftermath of the recent winter storms, my base here, Barksdale Air Force Base in northwest Louisiana, has been cited as a good case study for its resilient water system. And the base has the redundancies in place so that it can switch from its primary water source, which is the city of Shreveport, our largest municipality, to a secondary storage if the need

arises. And I have been told that while these water redundancies were a godsend during the recent winter storm, there were fairly significant issues with power generation. The base has diesel generators in place for mission-critical facilities, but there are logistical concerns with making sure there is enough fuel on hand to keep them running.

So, as you look at electricity redundancies on our installations, I am curious what your thoughts are on capitalizing on the characteristics of each individual installation and their surrounding communities.

So, for example, Barksdale, our home in northwest Louisiana, is a natural gas-rich area with a significant amount of infrastructure in place that I think would make a transition to natural gas generators or even a natural gas power plant relatively easy.

So, should we be capitalizing on those types of geographic qualities and distinctions, and can you speak to any examples of where the Air Force has done that in other parts of the country?

General ALLEN. Can you hear me, sir?

Mr. JOHNSON. Yes, sir.

General ALLEN. Okay. I think you are exactly right, we need to tailor our resiliency, whether that is water or power, to what best fits the circumstance where the installation is. And very often, what that might look like is just a separate substation for power, a redundant feed, if you will, that is not necessarily connected back to the same plant that could fail and deny power.

We have used spot generation powered by diesel fuel around our installations for years. I think there are better ways to do that now, but we still do rely on that significantly. Some of the work that we do through UESCs [utility energy service contracts] or energy assurance leases involve natural gas power generation coming onto the installation, which, essentially, allows us to island, should we need to, from the grid. Or if we are island, that allows us to continue to operate.

So, our energy assurance leases, while we like green energy, aren't necessarily always involving the use of green energy.

So, to your point, we are going through these programs. Our focus in energy resilience and water resilience, has been mission assurance. And so we are going for the solutions that will deliver us the best bang for the buck in the way of mission assurance, and sometimes that does involve, to your point, natural gas generation. Does that help?

Mr. JOHNSON. Very helpful. I appreciate that. It gives a little perspective on it.

I have another question. Let me go to General Gabram if I can. As you know, Fort Polk has been a case study in resiliency in the past year. And I have that installation in the south part of my district, towards south Louisiana. And we had a recent weather event. Of course, it wasn't as big of a resiliency threat, really, as Hurricane Laura presented in August of last year. There was significant challenges with electricity generation during that event.

And as we look to expand the concept of building resiliency through energy generation and microgrids on installations, would you agree that we should be prioritizing those installations that

history shows are really more likely to suffer from extreme weather events than others?

General GABRAM. Congressman, absolutely. And, you know, as we look around the country, and we regionalize and we look at geography, it is really important. And we look at patterns, and this is the tools we've talked about today help us make that assessment. I am very close with Fort Polk, with Laura, and Delta—the second hurricane, remember, that came through was Delta—and then now Uri. I would tell you, you can be really proud of the team there at Fort Polk. Their resiliency in the human dimension, they really did great. And the partner on the ground, frankly, Corvias, as we are still working on roofs, because roofs were a big part of the damage. The good news is the new roofs that we were put on the privatized homes did very well in the Winter Storm Uri.

So, I absolutely agree with you 110 percent. Fort Polk is just in an area of the country where it is susceptible to the climate change aspects left and right. So agreed. Thank you.

Mr. JOHNSON. Thank you for that answer, and I am out of time. I yield back. But I just say, first, we are blessed to be in the greatest State in America. But, yes, we are situated, geographically, to take a lot of hits. So thank you for that, and I yield back.

Mr. GARAMENDI. Let's see, every committee member let that comment slide by, Mr. Johnson. The gavel order, Strickland, Moore, Luria.

Ms. STRICKLAND. Thank you, Mr. Chairman. I am from Washington State, and I am going to quibble a bit with my colleague about the greatest State. But with that said, Joint Base Lewis-McChord [JBLM] is in my district. And Washington State doesn't have the same type of weather events like hurricanes and severe winter storms, but we are increasingly impacted by changing weather conditions that have led to large-scale forest fires on both sides of our State. And one of the ways that climate change has affected Joint Base Lewis-McChord is really about the wildfires and the impact. We have warmer weather, we have changing rainfall patterns, we have severe winds, and those create wildfires that are just damaging and devastating. And these are going to get worse if we don't start to take climate change seriously.

You know, I am glad to hear that the Secretary of Defense has declared climate change a national security issue, because it, in fact, is.

And so I want to start with General Gabram and really talk about fire resiliency and earthquake preparedness. So, again, while the recent wildfires didn't reach JBLM, or even the Yakima Training Center in eastern Washington, can you talk a bit about fire and earthquake resiliency strategies that you are using on the west coast? And just tell me a bit about what you are doing.

General GABRAM. I just had the opportunity to visit JBLM, oh, about 3 weeks ago, and had a great time. I would also like to say, not related, but they are going to open the first children's museum in our Nation in April, and it is going to be great for families.

But to address your primary question that we do have a wildland fire program at JBLM. And the three things that we are looking at right now are controlled burns, fuel reduction, and then fielding a proper fire equipment. And I would like to say on the wildfire

side, you know, it comes down to manning in some places and people—97 percent of our garrisons have qualified wildland program managers, they are called, and, obviously, JBLM has them with the position they are in in the country.

And we also—the critical mission nodes, or critical nodes, as you know, is Gray Army Airfield; the Western Air Defense Sector; the ammunition storage points; mission, and command and control centers; and then the fire and emergency centers at JBLM. And so we know those are critical and very important.

We assessed the earthquake risk at JBLM as medium. I know that probably doesn't make you feel good, but those facilities—a lot of the facilities were built between the 1940s and 1980s. So that infrastructure we are looking at very closely. Because 60 percent—relating to the earthquake threat—60 percent of the buildings are not constructed to current code to withstand a greater than a magnitude 6 earthquake. So I think we know our jersey number at JBLM, we just got to work to protect.

Ms. STRICKLAND. All right. Thank you, and then I have one more question. Like I said earlier, the fires didn't necessarily reach the base, but we know that wildfires have a severe impact on air quality. And in many times during the summer, we did air quality ratings that are very, very unhealthy for sometimes weeks at a time. And this can cause respiratory issues, it can cause bronchitis.

So, can you talk a bit about how these types of incidents affect readiness, because, clearly, people aren't even advised to go outside and do training and physical activity.

General GABRAM. I think you are referring primarily up towards Yakima, because there is a lot—as you know, there is a lot of training that goes there from JBLM. But the air quality is a concern. Obviously, I think the smart thing to do and we do is understand when it is and where it is. And then training, you know, we don't go out and train in the middle of a 10-day air quality issue where we expose our soldiers to those type of conditions.

So that is taken into effect by the chain of command. So I don't have a fix for that, per se. But in terms of discipline, to set our life, health, and safety, I call it, to set our folks up correctly, we do take that precaution. I hope that answers your question, ma'am.

Ms. STRICKLAND. Great. Thank you very much. And thank you for acknowledging the children's museum at JBLM. I was here when the First Lady was visiting, and it is the only children's museum on a military installation in the U.S., and so, we are very proud of that facility. I yield back, Mr. Chair.

Mr. GARAMENDI. So, Mr. Johnson, take that.

Mr. Moore.

Mr. MOORE. Thank you, Chairman. And I will let everyone quibble over each of their States. I think that Utah's record and performance stands on its own. So we will rise above this conversation, and we will just let it settle.

Thank you all for being here today. It is an important topic to discuss, and seeing how this interacts. Something I am excited about is I am on the Natural Resources Committee and Armed Services Committee, and hope to be a reasonable solid voice in this matter.

And one question, I have a couple of questions. General Allen, you may be aware, in 2019 the DOD listed Hill Air Force Base in my district the number one base susceptible to climate change. But just a few months later, an Air Force report did not even have it listed on the top 10. So there is some inconsistency or discrepancy there.

My question would be is there efforts in place to ensure that we have, or that's broadly communicated, a framework that is used, whether it be the basis, criteria, or methodology used in making these determinations? Is there an effort in place? Are you committed to continuing that? You can see how that would be alarming to be number one, and then all of a sudden, not even on [inaudible] Air Force bases [inaudible].

General ALLEN. Thank you, Congressman, yes, I was working in the Pentagon when that happened. The first list was calculated using criteria that the Office of the Secretary of Defense issued. And when we saw the results, we ran the list and ran the criteria a little differently, and that was the second list you are talking about.

I guess what I would say is each was a top 10 list, and all 20 of those installations are high on our cross-check to understand how they are, in fact, threatened by climate change and atmospheric conditions, weather conditions, et cetera. Does that help you, Congressman?

Mr. MOORE. Yes, I understand there is a commitment to broadly communicate the framework and what goes into it because, you know, lists are lists, but if we [inaudible].

General ALLEN. I can tell you that our installation development plan—[inaudible] can you all hear me? Congressman, I lost you there for a second. Can you hear me? Am I muted? Can y'all hear me? I think I am not hearing anything.

Mr. GARAMENDI. I think Mr. Moore has a communication issue. And we are going to come back to you for another 2 or 3 minutes. Mr. Moore, you want to try one more time?

Mr. MOORE. Can you hear me, Chairman?

Mr. GARAMENDI. We can now. Please, continue.

Mr. MOORE. Just one more question, General.

Mr. GARAMENDI. We are getting some—I am getting some serious feedback from somebody who has a microphone that is not muted.

Okay, Mr. Moore, your turn.

Mr. MOORE. General Allen, enhanced-use leases. My next question is enhanced-use leases, an ability for the community to interact with the Air Force, in our case, are such a positive. I view them as a win-win. That is the way I communicate them. Do you know if there is any chance to use enhanced-use leases to help fill the gaps in energy resilience improvements where maybe MILCON dollars are not able to be used?

General ALLEN. Congressman, can you hear me okay?

Mr. MOORE. [No verbal response.]

General ALLEN. Absolutely. There is. We have enhanced-use leases that return value, fair market value, for whatever the lease is, back to the Air Force so that we can invest those dollars in energy initiatives. And then we have, I guess, I would say, enhanced-use leases that are tailored to energy assurance. We call them en-

ergy assurance leases, where we are actually taking underutilized land, partnering with a developer who will bring in some sort of energy generation, perhaps, to put onto the grid, or perhaps to put right back into the installation. Or most often, you know, to put energy into the grid, to sell into the grid, but then we have an agreement with them that should we need it in the event of a denial of service, then we would get that energy, if that makes sense.

So, enhanced-use leases, broadly, yes, we get fair market value for whatever underutilized land we are leasing. And we can use that money typically to reinvest in facilities which improves their resiliency. And then very specifically, to energy assurance, we have energy assurance leases, which are targeted at just what you are talking about. Over.

Mr. MOORE. Thank you so much. And, Chairman, sorry for some of my connectivity issues. I will just end with saying to my colleagues on the committee, and to General Allen, our office is always available to talk enhanced-use leases. We really do find them to be a really productive way. And I open that up to any of my colleagues if they want to be involved at all. Thank you all. I yield back.

Mr. GARAMENDI. Thank you very much, Mr. Moore. For all of us that are actually all across the Nation, in the South as well as in the West, the Federal Power Administration, Western Power, WAPA, in the West, is providing energy to Beale Air Force Base. And their purpose, among other things, is to provide power into the general grid, but also, specifically, to provide power to the Federal Government programs. And, so, if you happen to have one of those grids from the power administration, Western Power, the eastern side to Georgia and that area, we will look at that.

And, General Allen, again, a best practice that might be shared across the services. So a little memo from you about what you are doing at Beale, and how that is working out would be shared all around.

Okay. I am going to go now to Mrs. Luria. That would be the last person on the first round. And we might have an extra half hour after Mrs. Luria.

One more thing, if there is a serious disruption of my service, Mrs. Luria, you are taking over. So, not only do you get to question, but you may have the chair.

Mrs. LURIA. Well, thank you, Chairman Garamendi. And thank you to our witnesses today. My district includes Naval Station Norfolk, a large part of Hampton Roads. And my question I am going to address to Admiral Lindsey, and also to General Allen, because of Langley Air Force Base. And Hampton Roads is particularly at risk because of sea level rise.

I was just looking at some of the provisions in last year's NDAA, which required the examination of community infrastructure located outside the installation that is necessary to maintain mission capability, or that impacts the resilience of the military installation, such as civilian infrastructure related to disaster risk reduction, power, water, communications, transportation, and emergency services.

In Norfolk, for example, this seems to particularly pertain to Naval Station Norfolk and the access road of Hampton Boulevard,

which floods frequently and is projected to flood more frequently over time.

General Allen, I know that at Langley Air Force Base, there are some similar issues related to sea level rise with current flooding that are specifically of interest. And I have gone to visit the pump stations there, and kind of understand some of the flooding issues at that installation.

And so, I was just curious if you could both weigh in on any guidance you have to the localities that seek to work with DOD in order to use some of the existing authorities and funding that we put in place for defense access roads, defense community infrastructure projects, so that we can best create that partnership between DOD and the local community to make sure that we, you know, literally shore up some of these issues with sea level rise and flooding. And make sure that we can continue to have access to these bases, and that you would make recommendations-wise for that coordination and any guidance you have.

Admiral Lindsey, do you want to go first?

Admiral LINDSEY. Yes, ma'am, and thank you for the question. And thank you for your support of our men and women [inaudible]. And the important mission that the Hampton Roads area serves, not only for our Navy but for our Nation.

I think there is some great examples of where we collaborated with the local communities. A fundamental mission of our installation is to maintain good relationship with the people—productive relationships, good cooperative, coordinated relationships. And the joint land use studies that we recently completed here a couple of years ago, I think, are a good example of that where we look at land use outside the fence line, so to speak, in the communities, and work together to make sure that not only is able—the way land sustained in military mission but also how we can partner to help the local community, to [inaudible] land a more productive and efficient way, so to speak.

And then you bring up Hampton Boulevard. There are some challenges we continue to tackle in that area. And so as we renovate, as we construct, as we do things to modernize and sustain the installation there, we are constantly weaving in the aspects of sea level rise and climate change so that that installation can persist and continue to do its mission for many decades in the future.

So that is another important part of what we are doing at Hampton Roads is getting after the resiliency, climate change issues through our mission, our mission assurance assessments, other tools that Congress has provided that we talked about, ESPCs, EULs [enhanced-use leases], and those things.

So I think the relationship there is good, it is productive. As you know the communities submitted a Defense Community Infrastructure Program grant request to help with some of those issues. The two installations gave endorsing letters to that. It was not picked up recently, but we are hopeful going forward that they will be successful in being able to get some of those grants to address some of those issues that you have highlighted here. Hopefully, that answers your question from a Navy perspective.

Mrs. LURIA. Yes, well, thank you Admiral Lindsey. General Allen, from the Air Force perspective, do you have any additional

guidance or words of wisdom for our surrounding communities outside of Air Force installations that would help improve coordination for these types of projects?

General ALLEN. Thank you, Congresswoman. I have had the privilege to be stationed at Langley twice from 2003 to 2005, and then again from 2013 to 2015. I look at Langley as perhaps being a pathfinder for other communities. I will give a shoutout to retired Navy Admiral Craig Quigley who runs the Hampton Roads Federal Facility Alliance. And then we had tremendous partners in Hampton, the city of Hampton.

When I was there, we were doing a lot of partnering with them on reducing encroachment around the airfield, which was very important. We had already been the benefactor of a lot of recovery money from Hurricane Isabel that came through in 2003. So we were able to do about \$500 million worth of improvements between the hurricane recovery and the F-22 beddown. And you mentioned the pump station that we put in that allows us to move rainwater off the installation. You know, it helps with our flooding problems.

So those things we did early, and I got to enjoy them when I was there 10 years later. It really worked. Langley is a place that understands climate resiliency, so it is really built into every dollar that they are spending, because they are living the challenges of that.

But I think what is most important, frankly, are those partnerships that we have with HRMFFA [Hampton Roads Military and Federal Facilities Alliance] and with the city of Hampton, and they are very, very active participants in bringing P4 [public-public and public-private] solutions to the table for us. At least that was my experience when I was there. So I mean, it is an example for others.

Mrs. LURIA. Well, thank you, General Allen and Admiral Lindsey. And I agree that HRMFFA, as an organization, really brings together both the military and our communities across Hampton Roads to help solve these problems. So we are grateful for Admiral Quigley and his work.

And also, I want to say that, you know, Langley has a place in my heart, too. My daughter was born there at the hospital. So thank you, again, for appearing today.

Mr. GARAMENDI. Thank you very much, Mrs. Luria.

We are now going into the second round. I am going to forgo questions that I would ask, but I will make one comment.

The hearings that we have had this year and in previous years all intersect. We have talked about the depots, about the shipyards. We have talked about this whole issue of resiliency. These issues all come together in the maintenance and the upgrade of the bases. And, so, as we go into this year, I want to make sure that we pay attention in the NDAA to the necessary investments to maintain these bases.

Now, Mr. Wilson, Mrs. Luria, and Mr. Johnson are up for questions. I would alert everybody that General Banta had to leave for a meeting at the half-hour mark, and so, he has departed the hearing.

So Mr. Wilson.

Mr. WILSON. Mr. Chairman, thank you very much. And, actually, I want to commend all of our witnesses, they really very well answered so many of the issues that I feel so positive about, like energy savings performance contracts. Hopefully, looking at small mod reactors to be self-sufficient in the event of severe weather, just as the incredible snowstorm, just inconceivable of what occurred in Texas so recently. My goodness. And so, with all of this, indeed, this is directly related to readiness. And I am really grateful for the military leadership that are being proactive to get ready and to look out for our service members and our ability to protect American families. And so with that, I yield back.

Mr. GARAMENDI. Thank you very much, Mr. Wilson.

Mrs. Luria, we are back to you.

Mr. Kahele, are you still with us? Okay. Here is the order, Wilson, you just finished. Luria, Johnson, and then that will complete it unless somebody else rejoins.

Mrs. Luria? I believe she may have been satisfied with her last round of questions, and she has left.

Mr. Johnson? One more time, would you like to comment on the glories of Louisiana one more time?

Mr. JOHNSON. I won't take advantage of my time and do that again. It speaks for itself. It is *res ipsa loquitur*, as we say in the law, things speak for itself.

I am really for the generals for their straightforward answers today. It really helps. I am a new member of the committee and the subcommittee. And I just find all of this fascinating. So I am grateful to just listen in. So thank you for all of that. I yield back.

Mr. GARAMENDI. Well, I just see Mrs. Luria has returned. You came very close to losing your slot, Mrs. Luria, but go for it.

Mrs. LURIA. Well, Chairman Garamendi, I will pass on further questions and really appreciate the witnesses' time today. Thank you.

Mr. GARAMENDI. Thank you. That completes all of the witnesses. There are some questions that had been asked for the record, and those have been submitted. There may be a few more. So if any of the members have questions for the record, please get them to the staff soon, like, within the next couple of days.

I do want to thank our witnesses. You have an extremely important role, as do we. The communication between your work and our work is essential if the issue of resiliency is going to be resolved.

I mentioned a moment ago that this particular hearing cuts across much of what we do here in this committee. We are responsible for the physical infrastructure of the Department of Defense facilities, and, therefore, the information given today and in the days and weeks ahead, as we put together the next NDAA, will be essential.

So for the presenters today, the professional staff will be back in touch with you. I also will reach out to the committee members who have knowledge of the installation in their districts, and ask them to inform us of issues that they know of that may not be working its way up through the chain of command.

So as we work together to address resiliency and the installation performance, we will be looking to just that, working together.

So Admiral Lindsey, thank you so much. General Banta, I would thank you if you were still here, but we will send a little note of appreciation. General Gabram, thank you very much. And General Allen, thank you for your participation. We look forward to working with you in the days ahead. So with that, this hearing is adjourned. Thank you so very much.

[Whereupon, at 4:34 p.m., the subcommittee was adjourned.]

A P P E N D I X

MARCH 26, 2021

PREPARED STATEMENTS SUBMITTED FOR THE RECORD

MARCH 26, 2021

RECORD VERSION

**STATEMENT BY
LIEUTENANT GENERAL DOUGLAS GABRAM
COMMANDING GENERAL
UNITED STATES ARMY INSTALLATION COMMAND**

BEFORE THE

**SUBCOMMITTEE ON READINESS
COMMITTEE ON ARMED SERVICES
UNITED STATES HOUSE OF REPRESENTATIVES**

FIRST SESSION, 117TH CONGRESS

**INSTALLATION RESILIENCY: LESSONS LEARNED FROM WINTER STORM URI
AND BEYOND**

MARCH 26, 2021

**NOT FOR PUBLICATION UNTIL RELEASED BY THE
COMMITTEE ON ARMED SERVICES**

Introduction

Chairman Garamendi, Ranking Member Lamborn and distinguished members of the Subcommittee on Readiness, thank you for this opportunity to testify on the topic of installation resiliency, and especially in light of the recent events of Winter Storm Uri.

I look forward to providing an update and addressing your questions on the Army's efforts in regards to enhanced resiliency measures across Army installations in support of the Army's three priorities—People, Readiness, and Modernization. On behalf of Acting Secretary Whitley and General McConville, thank you for your strong support and continued commitment to our Soldiers, Families, Army Civilians, Retirees, and Veterans.

Winter Storm Uri

The extreme weather events of February 13-17, 2021, during Winter Storm Uri, enabled our installations to demonstrate their abilities to plan, command and control, and execute contingency operations. Over those four long days, Army installations in Kansas, Oklahoma, Louisiana, and Texas experienced a combination of damaging ice, snow, and frigid temperatures that shattered national weather records.

As a result of the winter storm, 694 installation facilities, including 483 barracks and 1,366 privatized homes across four installations (Fort Sill, Fort Riley, Fort Polk, and Fort Hood) were damaged in some manner. However, while 15,215 total privatized homes at these 4 locations were impacted, only 145 Families were temporarily displaced, and as of March 17, 2021, just 31 Families remain displaced as repairs are being made. I am very proud of our installation commanders, and their close coordination with our Residential Communities Initiative partners, especially Corvias, Lendlease, BBC, and Lincoln, to prepare for and immediately respond to the needs of our Soldiers and their Families following the storm. Without this collaborative, proactive leadership, the storm impacts would have been much worse. I can say with confidence

and personal experience that our military installations fared better than the local communities due to the attention paid to contingency planning to maintain energy and water supplies.

Each affected installation and their respective partners prepared for such an event by maintaining and jointly exercising their severe weather contingency plans. As an example, Fort Polk conducts an annual weather exercise as it prepares for hurricane season. This exercise was key to Fort Polk quickly recovering from two hurricanes last year, and played a key role in both preparing for, and recovering from, Winter Storm Uri.

Furthermore, the entire Army team, to include Senior Commanders, privatized housing partners, utilities privatization contractors, the Army Air Force Exchange Service (AAFES), the Defense Commissary Agency (DeCA), and installation tenants, took proactive steps ahead of the storm to minimize impact. Priority was placed on the life, health, and safety of personnel, followed by protection of facilities and equipment.

Immediately after the storm, General Ed Daly, Commander of U.S. Army Materiel Command, traveled to Fort Sill and I traveled to Fort Hood to assess storm damage. While several facilities sustained moderate to significant damage, our installation team took rapid action to contract for repairs and mitigation in support of our Soldiers and Families. The Army continues to surge repair efforts to these four installations. To date, we have repaired all critical infrastructure and have completed more than 50% of the total repairs required. Ultimately, due to our installations' preparations, we were able to immediately account to Army senior leaders and senior mission commanders the total impact to installation facilities and personnel, mitigating immediate readiness risks.

Lessons Learned

1) *Deliberate Planning and Holistic Response*. Our planning effort in preparation for the winter storms was thorough and clearly mitigated the storms' impacts. For example, non-winterized water systems were shut down ahead of time where possible. Following

the storms, we leveraged a holistic, enterprise approach, maximizing the use of contracts and Army Corps of Engineers efforts to surge maintenance teams and accelerate repair efforts. We continue to conduct daily coordination sessions to assess recovery operations and to share lessons learned. I am proud of the herculean efforts of our installation public works and emergency management staff, the Army's privatized housing partners, and the utilities privatization contractors, all of which rapidly responded to crisis and put us on a path for a quick recovery.

2) *Age and Condition of Facilities.* Aging and poor facilities and systems failed first and most often. I visited Fort Hood and saw firsthand the air conditioning and heating systems in barracks which failed largely due being old and antiquated. For many of these systems, it is difficult to even find repair parts. Additionally, many of our facilities had exposed water pipes and fire suppression systems that, due the freezing weather, failed and led to burst pipes, causing significant water damage. Our Army leaders are aware of the challenges with our facilities, especially our barracks. As a result, they have made renovating or replacing barracks one of their top infrastructure priorities. As part of the Army's overall modernization effort, we are taking steps to modernize our installations to build resiliency and ensure our Soldiers and Families have the quality Army communities they deserve.

Moving Forward

1) *Installation Resiliency.* The Army's recently published Installation Strategy defines a clear end state: **modern, resilient, sustainable installations . . . that enhance strategic readiness in a contested Multi-Domain Operations battlespace while providing quality facilities, services, and support to our Soldiers, Families, and Civilians.** As part of the efforts to achieve this end state, Army Materiel Command is leading the Army's effort in executing the Army's Installation Energy and Water Strategic Plan, in close coordination with Headquarters, Department of the Army G-9 and the office of the Assistant Secretary of the Army for Installations, Energy and Environment, which focuses on building energy and water infrastructure that is resilient,

efficient, and affordable. Our installations are preparing Installation Energy and Water Plans which both assess the status of our current energy and water systems and, more importantly, identify opportunities to increase resiliency of these systems across our installation footprint. The Army is on track to complete the majority of these plans this calendar year. Additionally, AMC is partnering with the Department of Energy Pacific Northwest National Lab to operationalize these plans into prioritized energy and water projects which will compete for resources. To execute these plans, the Army is pursuing alternative financing, including Energy Savings Performance Contracts and Utility Energy Savings Contracts. These contracts allow the Army to partner with an energy service company in order to leverage their expertise in energy efficiency and cost reductions. The Army already has 99 of these energy savings contracts in place and is exploring opportunities to expand their use.

2) *Army's Facility Investment Plan (FIP)*. The FIP is the Army's holistic infrastructure plan that prioritizes facility improvements IAW Army priorities over a 10 year span. The FIP captures all facility construction, restoration, and modernization requirements for the Active Component. This plan is critical to installation resiliency as it allows Army leaders to visualize the totality of the Army's infrastructure requirements and thus enables our leaders to focus resources in support of Army priorities.

Conclusion

Winter Storm Uri, in many ways, was a "once in a decade" type of event. Our proactive and engaged leadership, coupled with collaborative partner engagement, enabled the Army to minimize the impacts of the storm and allowed for rapid transition to recovery. We will capitalize on the lessons learned from Winter Storm Uri to be even more prepared for similar events in the future.

We will continue to drive on executing the Army Installation Strategy, which established the guiding principles of achieving modern, resilient, sustainable installations in support of the National Defense Strategy. The Army Installation Strategy

describes the Army's objective: "To the maximum extent feasible, each installation will have resilient power, water and communications systems—prioritized by mission requirement." The Army will modernize installations to support an increasingly modern force with sustainable and resilient utilities and services.

I am incredibly proud of the Army team who works hard to maintain and improve readiness of the force with quality installations and services. They meet the requirements of our national security mission while taking care of the Soldiers, Families, civilian professionals and others who come through our gates every day. Their efforts to support Soldiers and their Families, maintain and improve our facilities, and protect our force deserve the highest praise.

Chairman Garamendi, Ranking Member Lamborn, thank you for the opportunity to testify before the Committee. I look forward to your questions and continuing to work with your offices to keep you apprised of the Army's progress toward achieving our end state of modernized installations and platforms that protect, support, and enable the Total Army.

Thank you for your continued support of the Army, its Soldiers, Families, Civilians, Retirees, and Veterans.

Lieutenant General Douglas M. Gabram
Commanding General, U.S. Army Installation Management Command

Lieutenant General Douglas M. Gabram assumed duties as the Commanding General of the U.S. Army Installation Management Command January 22, 2020.

Lieutenant General Gabram most recently served as the Director for Test at the Missile Defense Agency. In this capacity, he was responsible for planning, programming, budgeting, and implementing a comprehensive Ballistic Missile Defense System (BMDS) test program to field an integrated and effective capability to the services and combatant commands.

Lieutenant General Gabram received his commission as a Distinguished Military Graduate from Bowling Green State University, Ohio in 1984. Previous notable assignments include: Deputy Chief of Staff, G-3/5/7 for the U.S. Army Training and Doctrine Command, Joint Base Langley-Eustis, VA; Deputy Commanding General (Support), 1st Cavalry Division "America's First Team;" Deputy Commander for the U.S. Army Aviation Center of Excellence; and Chief of Staff 1st Cavalry Division. Previous command assignments include: Commanding General, US Army Aviation and Missile Command, Brigade Command, 1st Air Cavalry Brigade, 1st Cavalry Division; Battalion Command, 1st Battalion 101st Aviation Regiment, 101st Airborne Division (Air Assault); and Company Command, B Company, 1st Battalion, 101st Aviation Regiment, 101st Airborne Division (Air Assault).

His combat deployments include two tours to Afghanistan for Operation Enduring Freedom/Resolute Support with the 1st Cavalry Division as the Division Chief of Staff, Deputy Commanding General, and TAAC-South Commander; three tours to Iraq as part of Operation Iraqi Freedom, twice as a Battalion Commander and once as a Brigade Commander; one tour to Bosnia as part of Operation Joint Guard and Macedonia as part of Operation Joint Endeavor; and one tour to Saudi Arabia as part of Operation Desert Shield/Storm.

Lieutenant General Gabram holds a Master's degree from Central Michigan University in Business Administration and completed a Senior Service College Fellowship at the University of Texas, Austin.

NOT FOR PUBLICATION UNTIL
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SERVICES COMMITTEE

STATEMENT OF

VICE ADMIRAL YANCY B. LINDSEY
COMMANDER, NAVY INSTALLATIONS COMMAND

BEFORE THE

SUBCOMMITTEE ON READINESS
OF THE HOUSE ARMED SERVICES COMMITTEE

ON

INSTALLATION RESILIENCY: LESSONS LEARNED
FROM WINTER STORM URI AND BEYOND

MARCH 26, 2021

NOT FOR PUBLICATION UNTIL
RELEASED BY THE SENATE ARMED
SERVICES COMMITTEE

Chairman Garamendi, Ranking Member Lamborn and distinguished members of the Subcommittee, thank you for the opportunity to testify on the resilience of Navy installations and the lessons learned from recent extreme weather events.

Navy installations provide the foundation from which the United States Navy develops, generates, projects and sustains naval power. Therefore, it is imperative that our installations rapidly prepare for, adapt to and recover from extreme weather events and changing environmental conditions. Winter Storm Uri and the recent hurricanes in Florida and on the Gulf Coast highlight the importance and urgency of Navy's efforts to enhance the resiliency of our installations. We must continue to harvest lessons learned from these events and apply them across the Navy shore enterprise.

The Navy conducts rigorous operational planning to ensure our critical missions will continue regardless of any natural or man-made threat. All Navy installations have extreme weather plans, and Installation Commanding Officers work with local communities to plan for natural disasters and collaborate on shared environmental challenges. When a destructive weather event threatens our operations, every Navy installation is prepared to plan, coordinate and direct action to protect our people and sustain mission-essential functions. In the aftermath of any traumatic event, Navy installations work to restore full mission capability as quickly as possible.

In coordination with U.S. Fleet Forces Command, Navy Installations Command conducts an annual exercise every year before the hurricane season to prepare our installation staffs and test our instructions, processes and communications in a training environment. The Navy takes the continuity of our operations very seriously, and our leadership and staff are dedicated to putting in the time and resources needed to get it right.

Working hand-in-hand with mission commanders and operators at Navy bases, installation management personnel ensure that our facilities and structures can survive threats coming from many fronts. Thanks to the hard work and professionalism of the Navy's more than 500 professional civilian facility planners, we are adapting our infrastructure to mitigate the environmental challenges that each installation faces according to its unique mission and location. Sometimes it is as simple as siting an administrative building at a higher elevation. In other areas, we must change the structural design of a hangar to resist the possibility of intense winds. For example, as a part of a major renovation of Pier 8 at Naval Base San Diego, we are elevating the pier's replacement piles to account for modeled sea level rise data. At Naval Support Activity Panama City, Florida, we are designing a new Test Range Support Facility to better withstand hurricanes and flooding.

Over the last several years, the Navy has been steadily incorporating resiliency planning into all aspects of the facilities management lifecycle, from installation master planning to the design of new construction and major renovation projects. As directed by the Fiscal Year (FY) 2020 National Defense Authorization Act (NDAA), the Navy is adding a resiliency component to our installation master plans. The Navy has identified 17 "high risk" installations that are most vulnerable to climate change and begun incorporating resiliency into their installation master plans. Naval Magazine Indian Island was the first Navy installation to fully integrate a resilience component into their master plan in February of this year. The remaining resilience components for Navy's most "high risk" installations are being prioritized for completion, and we are targeting to complete another four installations by the end of 2021. The Navy is aggressively training our workforce of professional civilian planners to support this effort. We

are currently on track to incorporate resiliency into all Navy installation master plans by the end of 2022.

Region and installation facility planners are utilizing updated Unified Facilities Criteria, Department of Defense Sea Level Rise studies, the Department of Defense Coastal Risk Management tool and the new Navy Climate Change Installation Planning Handbook to mitigate risks to shore infrastructure. These tools provide a framework and decision support process to aid in developing climate change response strategies for their particular locations and mission sets. It is imperative that we incorporate new design criteria and the latest industry standards to help mitigate the impact of extreme weather and a changing climate.

The recent hurricane season in the Southeast and Middle Atlantic Regions and the 2019 earthquake at Naval Air Weapons Station China Lake have tested the strength of our existing infrastructure to withstand extreme weather and natural disasters. When we assess the damage caused by these extreme events, it is starkly clear: Modern facilities improve survivability as opposed to older facilities built to now-outdated codes and criteria. As we rebuild at China Lake, we will be engineering stronger, more resilient facilities capable of withstanding future earthquakes and other threats.

Unfortunately, it is simply not feasible for the Navy to rebuild all of our outdated infrastructure at once. To tackle installation resiliency challenges today, the Navy must collaborate with local communities, States, other federal agencies, and industry leaders to develop regional plans that protect military capabilities. Navy Region Mid-Atlantic has several partnerships to increase understanding of current and future risks to the greater Hampton Roads area in Virginia, which will assist us in identifying and addressing specific conditions, including recurrent flooding, coastal storms, and erosion, which have the potential to affect Navy

operations. To address wildfire risk, Navy Region Southwest successfully worked with the California Department of Forestry and Fire Protection (CALFIRE) to promote joint training opportunities in an effort to protect key infrastructure and communities within San Diego County. Navy squadrons conduct semiannual joint training with CALFIRE to ensure interoperability and an immediate response capability in support of local authorities. In Hawaii, the Navy has partnered with Kauai Island Utility Cooperative to improve energy resiliency at Pacific Missile Range Facility Barking Sands. There we have designed a 19 MW solar and 70 MWh battery energy storage system sited on Navy land, which -- during normal operations -- will supply energy to the local grid. The project also features a micro-grid functionality, which can immediately switch to provide the installation with local, stable, renewable power in the event of a grid outage.

Navy installations rely on resilient energy sources to power essential shore-based operations. To manage our installation energy security investments, Navy Installations Command has established the Energy Mission Integration Group (EMIG) that works across the entire Navy shore enterprise to prioritize energy security gaps, determine the most effective solutions based on data-driven decisions, and execute the best course of action using the appropriate funding strategy, to include third-party-financed projects. Since FY 2019, the EMIG has identified 45 projects that are in various stages of development and execution. In addition, every Navy installation has developed an installation energy plan to support future planning and better integrate installation energy requirements to the EMIG process. Finally, we are developing an Energy Resilience Readiness Exercise (ERRE) process that will include multiple phases that begin with table top exercises and finish with “pull the plug” events. These exercises will measure the installation’s resilience to conduct critical and essential missions while

disconnected from the commercial power grid. We have already completed table top exercises at Kings Bay, Georgia, and in San Diego, California. We are on track to complete five more by the end of FY 2022.

Acknowledging that water resilience is also critical to mission success, we have incorporated water resilience analysis into our EMIG process to identify gaps and prioritize investments against other commodities. In the FY 2020 EMIG, we tested water resilience criteria for Navy Region Southwest and prioritized necessary water resilience projects at Naval Base Coronado and Naval Air Station Lemoore. In the FY 2021 EMIG, we opened the analysis of water resilience to the entire enterprise and are currently developing eight projects to address mission-critical gaps. The identified solutions for our water resilience gaps range from utilities privatization to Energy Resilience and Conservation Investment Program (ERCIP).

The Navy's mission requires the majority of our installations to be located in coastal areas. So we are particularly mindful of the risks posed by sea level rise and storm surge, especially in areas that are prone to hurricanes and typhoons. The Navy is working to protect our installations from sea level rise and storm surge by incorporating mitigation measures into the overall design of our new construction and facilities restoration and modernization projects. Where required, we will develop specific projects like the military construction project currently underway at Norfolk Naval Shipyard to build flood protection walls around the submarine maintenance dry docks and low-lying portions of the shipyard.

The Navy is also taking a deliberate approach to sea level rise as we execute our Shipyard Infrastructure Optimization Program (SIOP). As part of SIOP, we will complete a sea level rise study for each of our four public shipyards. These studies will ensure that Shipyard Area

Development Plans incorporate sea level rise mitigation in all future development, in addition to specific projects that may be required to mitigate sea level rise impacts.

In accordance with the FY 2020 NDAA, the Navy is using sea level rise scenarios in the Department of Defense Regional Sea Level Rise database to analyze all budget-year projects to ensure designs can mitigate and withstand potential flooding. For current and future projects located in 100-year floodplains, we are assessing flood hazards and vulnerabilities during design and implementing necessary mitigation efforts to address these vulnerabilities. For example, sea level rise data for the year 2100 was used during the environmental planning and design phases of the new Coastal Campus project at Naval Base Coronado in California. The design configuration of five buildings was modified to incorporate the 1.6- to 6.5- foot science-based projected range to resist sea level rise over the buildings' projected lifecycle.

We appreciate Congressional support for the Readiness and Environmental Protection Integration (REPI) program, which Navy has successfully used to enhance military readiness by preventing, mitigating and reducing restrictions caused by encroachment near our installations and ranges. We have used a combination of Department of Defense funds, REPI funds and partner contributions to specifically address resiliency and climate initiatives. For example, the Navy is partnering with the Virginia Institute of Marine Science to restore more than three acres of Navy-owned land and stabilize more than 900 feet of shoreline in an area critical to the mission of Naval Weapons Station Yorktown.

As we continue our efforts to increase installation resilience, we will leverage the authorities granted by Congress to execute Intergovernmental Support Agreements, Other Transaction Authority, Utility Privatization, Energy Savings Performance Contracts, Utility Energy Service Contracts, Enhanced Use Leases and the Defense Community Infrastructure

Program. In concert with Executive Order 14008 and the newly-established Secretary of Defense Climate Working Group, the Navy will continue to incorporate climate risk analysis into installation planning and deploy new solutions to strengthen the resilience of key capabilities at our installations. I appreciate this subcommittee's unwavering support as the Navy confronts our resilience challenges today and in the future.

Vice Admiral Yancy Lindsey
Commander, Navy Installations Command

Vice Adm. Yancy B. Lindsey is a native of Phoenix, Arizona. He is a 1986 graduate of the University of California at Berkeley and holds Masters degrees from Marine Corps University and the University of San Diego. In addition, he completed a Federal Executive Fellowship at Tufts University's Fletcher School of Law and Diplomacy.

Lindsey was commissioned through Aviation Officer Candidate School in October 1986 and designated a Naval Aviator in December 1987.

Lindsey's sea duty assignments have included Antarctic Development Squadron (VXE) 6, twice with Carrier Airborne Early Warning Squadron (VAW) 113, and in command of Carrier Airborne Early Warning Squadron (VAW) 117. During these tours of duty, he completed three deployments to Antarctica and three deployments to the Arabian Gulf aboard USS Carl Vinson (CVN 70), USS Abraham Lincoln (CVN 72), and USS Nimitz (CVN 68).

Ashore, Lindsey served on the Joint Staff (J6); at Commander, Naval Air Force, U.S. Pacific Fleet; with the U.S. European Command staff in Stuttgart, Germany; as chief of staff to Commander, Navy Region Southwest; as executive assistant to the Assistant Secretary of the Navy for Energy, Installations and Environment; and in command of Naval Base Coronado.

As a flag officer, Lindsey was the 89th commandant of Naval District Washington; Commander, Navy Region Southwest; and Commander, Navy Region Europe, Africa, Central. He began serving as the 7th Commander of Navy Installations Command on 29 May 2020.

His decorations include the Defense Superior Service Medal, Legion of Merit, Meritorious Service Medal, Joint Service Commendation Medal, Navy and Marine Corps Commendation Medal, Joint Service Achievement Medal and Navy and Marine Corps Achievement Medal.

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ON READINESS, HOUSE ARMED SERVICES
COMMITTEE

STATEMENT OF

MAJOR GENERAL EDWARD D. BANTA
COMMANDER, MARINE CORPS INSTALLATIONS COMMAND

BEFORE THE

SUBCOMMITTEE ON READINESS
OF THE HOUSE ARMED SERVICES COMMITTEE

ON

INSTALLATION RESILIENCY: LESSONS LEARNED
FROM WINTER STORM URI AND BEYOND

MARCH 26, 2021

NOT FOR PUBLICATION UNTIL
RELEASED BY THE HOUSE SUBCOMMITTEE ON READINESS, HOUSE ARMED
SERVICES COMMITTEE

Chairman Garamendi, Ranking Member Lamborn, and distinguished members of this subcommittee, thank you for the invitation and opportunity to address what I consider among my most important tasks – installation resiliency. I also wanted to thank Congress for the support to Marine Corps Installations, specifically Hurricane Florence recovery efforts and our focus to improve the resiliency of our bases and stations. When we think of resiliency, we consider our installations ability to anticipate, prepare for, adapt to and recover from a wide spectrum of threats to our operational readiness, to include the effects of climate change.

I appreciate the opportunity to discuss this important issue which is critical to our ability to enable the readiness and warfighting capability of our Fleet Marine Forces (FMF) and the Joint Force. Thanks to the strong support we have received from Congress, the Marine Corps has made significant improvements in our installations, and we have initiated resiliency initiatives across our force. Of course, we still have much further to go in order to meet the evolving requirements of the future force as articulated in the Marine Corps Force Design effort. While experimentation is underway and many installation of the future requirements, specifically maintenance facilities, are not fully understood at present, we are joined at the hip with all elements across the Department of the Navy involved with developing the new capabilities and equipment for the future force.

We face emerging threats on many fronts, with myriad challenges in the current environment, and all signs indicate that those challenges will compound and grow. The most recent National Defense Strategy asserts the homeland is no longer a sanctuary. Our installations are vulnerable targets for a growing host of sophisticated threats and nowhere more so than those posed by identified pacing threats. In addition to ensuring our installations enable FMF readiness, we must modernize our installations and improve their resiliency to a wide spectrum of threats, including extreme weather events and the effects of climate change.

Installation Resiliency

Mr. Chairman, as you have stated, climate change presents myriad readiness challenges both at home and abroad. It is not only a future threat. The effects of climate change, sea level rise, and major weather events directly impact the resiliency of our installations and operations today. Our bases and facilities must recover quickly from extreme weather events and energy disruptions that could affect mission capabilities. Installation resiliency is foundational to enabling the operational readiness and warfighting capability of the FMF and our Joint Partners. Everything we do starts with that goal in mind, but we have a long way to go to reach that objective.

To quote my Commandant's testimony from last December, "At present our installations are more of an indication of where we have been as a service than where we are headed. Just as the Fleet Marine Force (FMF) is evolving, we must challenge our assumptions concerning how we deliver installation management and support."

Climate Change as a Threat to Operations

The Marine Corps has grappled with climate change and energy efficiency matters since the Obama Administration made climate change a policy priority. We recognize there are interdependencies between our installations and their surrounding communities, and many of those communities share our climate-related vulnerabilities. As service level design, experimentation, and development actions progress in response to the direction from current strategic guidance, both near- and long-term planning for our installations must include efforts to address the effects of climate change. As the installation arm for the "Soldiers of the Sea," we have a unique opportunity to support the DOD in mitigating the threats from weather related events and sea level rise.

Climate Change and its Impact on Institutional Planning

As most of our twenty-five installations are coastal by the very nature of our service, their long-term viability hinges upon robust protection of their shoreline as well as from other extreme environmental events. The significant backlog in maintenance and aging footprint is an example of where our trajectory of the last few decades must be altered. For example, our older assets and infrastructure were not prepared for the threats of even a moderate hurricane. As Hurricane Florence demonstrated in Marine Corps Installations East (MCIEAST), our new assets and infrastructure built with updated construction standards were significantly more resilient to the storm's effects than our older facilities. In rebuilding we've complied with policies and procedures to build outside of the 100 year floodplain and use current design standards that reflect updated building codes to make facilities more resilient to significant weather events. While we are incorporating vulnerability assessments and evaluations into our master planning process, we recognize we still have work to do across all installations. This includes preparing installations in Marine Corps Installations West (MCIWEST) threatened by droughts, wildfires and earthquakes, and Marine Corps Installations Pacific's (MCIPAC) exposure to typhoons, flooding and earthquakes. Looking ahead, we must prioritize and plan our efforts with special emphasis on facilities and infrastructure critical to support of the Fleet Marine Force and our Joint Partners. Central to this is focusing our constrained resources to ensure we are more resilient.

We also recognize the interdependencies between our installations and the surrounding and supporting communities. In short, we must look beyond the fence line and plan with our local partners. The current and future effects of climate change reinforce our firm commitment to address these issues in coordination with our surrounding communities. Based on our lessons learned, projections of future potential impacts, and current administrations' policy, we anticipate increased opportunities to address similar issues in coordination with federal, state, and local partners at all installations. In concert with Executive Order 14008 and the newly-established Secretary of Defense Climate Working Group, the Marine Corps will continue to incorporate climate risk analysis into installation planning and deploy

new solutions to strengthen the resilience of crucial capabilities at installations and with our surrounding communities.

Initiatives to Increase Installation Resiliency

We understand the criticality of improving the resiliency of our installation's critical functions, such as the power grid, water distribution, and communications capabilities, as we develop installation master plans ensuring we prepare for severe weather and climate change. Ultimately, our objective is to incorporate climate change impacts, severe weather, and lessons learned into every aspect of our institutional planning process. An example of this is Marine Corps Logistics Base (MCLB) Albany, which will become the first United States Marine Corps Net Zero Installation in April 2021. This significant energy achievement will produce as much electricity from renewable “green” energy sources as it consumes from the surrounding community utility providers. By doing so we improve the resiliency of the base while reducing our reliance on traditional energy sources and cutting back on greenhouse gas emissions.

Building on the operational energy success in MCLB Albany, the Marine Corps is adjusting its investment profile to meet the vision of the Commandant's Planning Guidance and Force Design 2030 by investing in new technologies that improve our resiliency. For example, the two smart grids in place at Marine Corps Recruit Depot Parris Island and Marine Corps Air Station Miramar enable us to maintain critical installation functions in the event of a local or regional power outage. Building on our experience here we continue to expand our understanding and plan for this emerging technology. Enhancing financing mechanisms for energy efficiency infrastructure projects will be critical to developing our plans for the installations of the future. Continued investments in these projects will place us on a trajectory to meet the future's challenging requirements and posture our installations to meet events like Winter Storm Uri or other extreme weather events.

Broadly, current recapitalization projects directly contribute to increase installations' resiliency to threats both environmental (climate change) and operational. Other tools such as Readiness and Environmental Protection Integration (REPI) Program, originally designed to protect against encroachment on training areas, could be reimagined to consider expanding protected areas as a mitigation effort to combat the effects of climate change.

Installation Planning in support of Force Design

To develop the installation of the future, we will prioritize the requirements of future tenants' needs over those of the present. To achieve our goals, we will have to develop a more effective organization that can balance the tension between current force requirements, mid-range force requirements, and those of the future. As broadly defined by our Commandant, the Future Force will have many new capabilities whose installation requirements are difficult to fully determine at present. As the service's experimentation effort continues, I expect these new requirements will come into greater focus. Ultimately, our force design efforts will provide the context necessary to make the difficult choices about our installations' present state and prioritize installation-related investments to meet the FMFs' evolving requirements. As we approach our future resiliency challenges, we will also leverage the authorities granted to us by Congress to execute Intergovernmental Support Agreements, Other Transaction Authority, Utility Privatization, Energy Savings Performance Contracts, Utility Energy Service Contracts, Enhanced Use Leases, and the Military Installation Resilience and Defense Community Infrastructure Program. Specifically, the Military Installation Resiliency Review (MIR) Program, sponsored by the DoD Office of Local Defense Community Cooperation (OLDCC) has funded a grant partnering MCRD Parris Island and MCAS Beaufort and local community partners - the Lowcountry Council of Governments, City of Beaufort and Town of Port Royal to further develop climate change resiliency plans supporting both the base and local communities. In coordination with

partners both inside and outside the service, we will evolve our regions, bases, and stations to meet the readiness requirements in all domains of the future force while providing world-class support to the force today.

Installation Support to the readiness of the Future Force

As articulated in the Tri-Service Maritime Strategy, we will prioritize investments that most directly support fleet operations and readiness and support basing and maintenance for current and future platforms. In addition to the guidance contained in the Commandant's Planning Guidance and Force Design 2030 report, Transforming Naval Logistics for Great Power Competition provides an aim point for our installation efforts as part of the much broader Naval Logistics Enterprise. The dynamic challenges faced by the naval expeditionary forces in the face of increasing climate and operational threats across all domains provide an opportunity to reevaluate old assumptions and develop adaptable, sustainable solutions for the ever-evolving operational environment. The demonstration of our capability to persist against all threats and sustain that effort is the critical capability for the success of the naval expeditionary force and the joint force. By persisting in the face of climate change or our near-peer adversaries' kinetic capabilities, we demonstrate we can weather the best of punches and remain resilient.

Conclusion

I appreciate this subcommittee's unwavering support as the Marine Corps confronts these resiliency challenges. As outlined in the National Defense Strategy, our installations must prove resilient in the face of the threats we face. We must continue to modernize our installations to protect our contact and blunt layer forces and reassure our partners and allies. Our operational capabilities are adapting to meet these changes, and we need to invest in next-generation installation infrastructure to match the growing Marine Expeditionary Forces. Your support is crucial as we continue to develop installation

infrastructure to support our Naval Expeditionary Forces at home and abroad to stand against the array of challenges we face, to include the effects of climate change. Thank you for the opportunity to testify before you today.

I look forward to working with you to sustain the warfighting capability, the readiness of our warfighting platforms, and our installations' resiliency.

Major General Edward D. Banta
Commander, Marine Corps Installations Command/Assistant Deputy Commandant,
Installations & Logistics (Facilities)

Major General Banta was promoted to his current rank on 3 July 2017, and is currently serving as the Commander, Marine Corps Installations Command, and Assistant Deputy Commandant for Installations and Logistics (LF).

Spending his formative years in California and Connecticut, Major General Banta graduated from Colgate University in 1986 and was subsequently commissioned through the Officer Candidates Course Program in December 1986. Following his initial training as a Combat Engineer Officer, he has held a variety of billets in the operating forces, supporting establishment, and the joint community.

Major General Banta's assignments in the operating forces include Platoon Commander and Company Commander in 9th Engineer Support Battalion, Assistant Operations Officer for 1st Light Armored Reconnaissance Battalion (Operation Desert Shield), Executive Officer for the I Marine Expeditionary Force Jump Command Post (Operation Desert Storm), Operations Officer and Company Commander for 1st Combat Engineer Battalion, Commanding Officer of Marine Wing Support Squadron 373 (Operation Iraqi Freedom), Operations Officer and Commanding Officer of Marine Wing Support Group 17, and Assistant Chief of Staff for Operations for 3d Marine Logistics Group.

His other assignments include Engineer Officer for the Tactical Exercise Evaluation and Control Group at the Marine Corps Air Ground Combat Center in 29 Palms CA, Program Analyst in the Programs and Resources Department at Headquarters Marine Corps in Washington DC, Force Structure Analyst in the Force Structure, Resources and Assessment Directorate (J8) on the Joint Staff in Washington DC, and Military Assistant to the Secretary of the Navy in Washington DC.

As a General Officer, he has served as Commanding General, 2d Marine Logistics Group, Commanding General, Marine Corps Installations West/Marine Corps Base Camp Pendleton, and Chief, Combined Joint Logistics (CJ4), Headquarters Resolute Support, Afghanistan, and Assistant Deputy Commandant, Programs, Programs and Resources Department, Headquarters Marine Corps.

He is a 2006 graduate of the Industrial College of the Armed Forces and holds a Master's Degree in Systems Management from the Naval Postgraduate School in Monterey, CA.

DEPARTMENT OF THE AIR FORCE

STATEMENT BY

**BRIGADIER GENERAL JOHN J. ALLEN, JR
COMMANDER, AIR FORCE CIVIL ENGINEER CENTER**

BEFORE THE

SUBCOMMITTEE ON READINESS

COMMITTEE ON ARMED SERVICES

UNITED STATES HOUSE OF REPRESENTATIVES

**SUBJECT: INSTALLATION RESILIENCY: LESSONS LEARNED FROM
WINTER STORM URI AND BEYOND**

MARCH 26, 2021

**NOT FOR PUBLICATION UNTIL RELEASED BY
THE COMMITTEE ON ARMED SERVICES
UNITED STATES HOUSE OF REPRESENTATIVES**

Introduction

Installations are a weapon system. Every Department of the Air Force (DAF) mission starts and ends on an installation. We project power, generate readiness, test new platforms, train to support joint operations, and provide safe and healthy communities for our families at our bases. As the Joint Force becomes increasingly dependent upon an integrated battle network, Air and Space Force installations also serve as key nodes in enabling mission success around the world. More than 330,000 active duty personnel organize, train, and equip at DAF installations, and for thousands of Airmen, Guardians, and their families, installations also serve as their homes and centers of life. The readiness and resiliency of installations is a matter of strategic importance to ensure the Air Force and Space Force can always provide combat capability to the Joint Force.

Secretary of Defense Austin recently released his top three priorities for the Department of Defense: Defend the Nation, Take Care of our People, and Succeed through Teamwork. He identified tackling the climate crisis as one of the lines effort under the priority to defend the nation, elevating climate as a national security priority. Changing climate and severe weather events are a continual threat to our installations. Over the past several years, the Air Force has seen first-hand the impacts climate and severe weather can have on our installations. The Air Force is aggressively moving forward with rebuild efforts at Tyndall Air Force Base (AFB), Florida, following the devastation caused by Hurricane Michael in 2018 and Offutt AFB, Nebraska, following historic flooding in 2019. We are also recovering from and continuing to assess damage from recent winter storms that brought extreme cold to much of the United States, impacting dozens of DAF installations throughout the Midwest and the southern part of the country. We must continually learn from these events and adapt to meet current and future threats to our installations posed by severe weather and climate, as well as physical or cyber-attacks.

The Department of the Air Force Installation Energy Strategic Plan

The recently released Department of the Air Force Installation Energy Strategic Plan highlights the Air Force approach to integrate resilience concepts and considerations at each step in the mission, from the strategic to tactical levels, to ensure enabling systems enhance mission assurance. The Air Force views installation resilience as the capability of a base to sustain the projection of combat power by protecting against, responding to, and recovering from deliberate, accidental, or naturally occurring events that impede air, space, or cyberspace operations. We take

a holistic and deliberate approach to addressing installation resilience on four primary fronts: energy, cyber, infrastructure, and response.

Energy Resilience

The Air Force requires reliable power and water to accomplish both operational and training missions. The overarching vision for the Air Force's installation energy and water program is "Mission Assurance through Energy Assurance." This vision is focused on securing the ability to perform our warfighting mission, in the face of disruptions to traditional sources, while simultaneously optimizing energy and water availability and productivity through better planning and technology and process improvements. Our approach to energy resilience starts with identifying system vulnerabilities through various methods such as mission thread analysis and black start or Energy Resilience Readiness Exercises (ERRE), developing mitigation actions and incorporating them into Installation Energy Plans (IEPs), and ultimately executing energy projects designed to improve mission resiliency. As one component of the overarching Installation Development Plan (IDP), IEPs identify water and energy requirements for each installation's critical missions, analyze potential vulnerabilities, and develop strategies to make enabling systems more resilient. By aggregating disparate elements of energy and water information and management, the Air Force will have the means to assess the status of energy and water systems, and communicate the potential impacts on mission readiness. The IEP does this by establishing a baseline that outlines energy and water requirements for each missions on the installation (both Air Force and tenant missions), and enables the installation to target resilient solutions.

Cyber Resilience

From an installation resilience perspective, our cyber resilience efforts focus on preventing, detecting, and responding to unauthorized access to DAF facility-related control systems, such as those associated with airfield lighting, power and water distribution, fire and intrusion detection, back-up generators, and heating, ventilation, and air conditioning (HVAC) systems. Control systems used to be manually operated and maintained. As infrastructure has matured to become automated and network-enabled, we have gained operational efficiencies without enough consideration for cyber vulnerabilities or the ability to operate in a cyber-contested environment. Following direction provided in the fiscal year (FY) 2017 National Defense Authorization Act and using funding from the FY17 Defense Appropriations Bill, the Air Force has assessed priority installations for cyber vulnerabilities to critical infrastructure. Additional efforts to improve cyber

resilience include segmenting these control systems from the Air Force communications network, embedding cybersecurity subject-matter expertise in our Civil Engineer Squadrons to aid the cybersecurity management of these systems, and developing and fielding cyber-specific education and training for our facility maintenance field technicians. When prioritized, we are also resourcing the modernization and replacing replacement of obsolete control systems through Military Construction (MILCON) or Facility Sustainment, Restoration, and Modernization (FSRM) projects and addressing identified vulnerabilities. Lastly, we are collaborating with the cyber defense community to establish agile detection, coordinated response, and recovery when a cyber-incident occurs.

Infrastructure

The Air Force continually accepts risk in installation investment, which over time leads to atrophied facilities and infrastructure. Degraded, older facilities are more susceptible to the effects of routine or severe weather events. For example, separation of roofing materials from a facility introduces a vulnerability where a strong wind could lead the weakened roof to collapse, undermining the facility's structural integrity and causing catastrophic failure. This was evident at Tyndall AFB during Hurricane Michael where facilities constructed more recently, using updated building codes, weathered the storm better than degraded or older facilities which were both constructed under older building codes and subject to longer term deferred maintenance. We also observed this during recent winter storms. In many instances, degraded facility systems and components failed which caused water and fire suppression pipes to freeze and eventually burst. Leveraging our long-term Infrastructure Investment Strategy (I2S), the Air Force enhances resiliency by proactively upgrading facilities through targeted facility investments informed by powerful analytics, stabilized funding, application of evolving building codes and Unified Facilities Criteria (UFCs) through MILCON or FSRM projects, and improved processes such as more standardized building components to increase maintenance efficiency. UFCs are the Department of Defense Building codes that implement industry codes and serve as our planning, design, and constructions foundation. They are updated by a tri-service panel to address changes in public law, military specific requirements and incorporate lessons learned from natural disasters, new technology, and industry standards.

The DAF is embracing an approach to natural infrastructure to enhance installation resiliency that relies on partnerships with other DoD organizations as well as Federal entities

outside of DoD. As witnessed by the devastation at Tyndall and Offutt Air Force Bases, damage to Air Force built infrastructure can be severe, but in the case of climatic events they may be attenuated by environmentally-conscious improvements to natural infrastructure. We are embarking on such a partnered approach at Tyndall AFB this year, where approximately \$26 million in cost shared efforts are underway. These efforts bring together federal, state, non-government and academic partners to field test environmentally conscious improvements to natural infrastructure. These improvements attenuate storm energy, whether from waves or wind, lessening the intensity of what passes through to built infrastructure. Combined with built infrastructure, which applies resilience features such as raised floor elevations and higher wind standards, the natural infrastructure improvements provide a cost-effective force multiplier to resilience, survivability, and mission assurance. Another example is underway at Offutt AFB where civil works built infrastructure provides additional flood protection for Air Force real property. In this case, the Missouri River Natural Resources District is repairing and improving levees which protect Offutt AFB. This is a \$35 million project that will raise the levees two to three feet and widen their bases. The work began in September 2019 and is scheduled to be completed in May 2021. This is a case where a non-federal partner is providing a front line of defense through natural infrastructure improvements.

Response

Improving resilience is not just about the tangible aspects of an installation, it also includes prepared Airmen, Guardians, and civilians. Even with the most state-of-the art building systems, installations will always be at risk due to deliberate, accidental, or naturally occurring events. Emergency management, disaster response, and continuity of operations planning are essential to ensure an installation can respond and recover from an incident quickly while continuing to execute the mission or, in more extreme situations, minimizing downtime. The Air Force Incident Management System uses the National Incident Management System as its foundation to integrate prevention, protection, mitigation, response, and recovery efforts across the installation while also synchronizing with local, state, and other federal agencies. Routine exercises of Installation Emergency Management Plans ensure personnel are ready to face any disaster. Two days before Hurricane Michael hit Tyndall AFB it went from a Category 2 on a path to bypass the installation to a Category 5 with direct line of sight on the installation. Due to emergency management preparedness, emergency management exercises, and installation emergency management plans,

Tyndall AFB evacuated all mission-capable aircraft, military members, and families in less than 48 hours. The result: *no loss of life or aircraft*.

The I2S serves as the Air Force's framework in planning and building resilient installations that are ready to withstand and quickly recover from manmade and natural events which potentially impact our missions. Numerous provisions in recent NDAA's align well with our strategy and are a key catalyst in advancing our installation resiliency efforts.

National Defense Authorization Act (NDAA) Provisions

In recent years, Congress has included numerous provisions in legislation to enhance installation resilience efforts across the Department of Defense. The Air Force, in conjunction with the Office of the Secretary of Defense (OSD), is implementing these provisions from a policy level all the way to execution at installations.

Installation Master Planning

The FY18, FY19, and FY20 NDAA's strengthened installation planning by requiring resilience be considered in each installation master plan, or IDPs, specifically including energy and climate resiliency efforts. In April 2020, the Air Force published a Severe Weather and Climate Screening and Risk Assessment Playbook. This playbook gives installation-level planners a consistent and systematic framework to screen for severe weather and climate hazards, assess relative current and future risks, and integrate the outputs into existing planning processes. The playbook also offers planners suggestions for how to adapt to hazards. As of early 2021, all major installations have used the playbook to complete initial assessments of installation exposure and risk due to severe weather and climate hazards. The results of these assessments will be used to develop the new FY20 NDAA-required Installation Resilience Component plan for AF IDPs over the next several years.

The Air Force is actively developing IEPs for 85 major Active Duty installations. These IEPs provide a standardized framework for Air Force installations to identify risks and track and adjust requirements to advance energy and water resilience goals. IEPs use a 5R framework (robustness, redundancy, resourcefulness, response and recovery) to assess resilience gaps and identify how an installation plans for and performs in a crisis. When complete, IEPs will be a component plan to the installation's IDP. To date, the Air Force has completed IEPs at 24 installations and is currently developing 20 more with estimated completion by November 2021.

The Air Force is planning to initiate 15 IEPs in summer 2021, and complete the 26 remaining installations in two additional phases.

In the 24 completed IEPs, the Air Force has identified over 300 installation-level resilience gaps, and an even larger number of mission-level gaps at individual buildings. These gaps range in priority, size, and complexity, but the Air Force is evaluating all of them for potential mitigation through additional analysis and a follow-up requirement development report which focuses on actionable tasks to close the gap. Common gaps the Air Force identified throughout the enterprise include lack of redundancy in electric transmission and distribution infrastructure, aging infrastructure past its useful life, lack of redundant HVAC systems for server equipment, fuel delivery and capacity concerns, water storage and quality concerns, lack of sufficient backup power, and energy and water conservation and efficiency improvement opportunities.

Following completion of IEPs, the Air Force develops one or more installation requirement development reports which recommend executable projects to mitigate energy and water resilience requirements and close the gaps identified in the IEP. The Air Force Office of Energy Assurance (OEA) has accomplished nine of these reports so far, identifying three Energy Assurance Leases (EALs), one Energy Resilience and Conservation Investment Program (ERCIP) concept, one Energy Savings Performance Contract (ESPC) and four Utility Energy Service Contracts (UESCs). Overall, through IEPs and other processes, the Air Force has planned and is currently executing 15 projects representing \$904 million in investments to directly address climate and extreme weather resilience as a primary driving factor. For example, ERCIP projects will help defend Beale AFB and Vandenberg AFB in California against the impacts of the devastating wildfires the region has experienced in recent years and two additional projects are supporting a microgrid for Offutt AFB, to maintain mission essential power in case of future flooding. Out of these 15 projects, \$750 million are budget neutral ESPC and UESC projects that are funded through energy conservation measures, helping to reduce DoD climate impacts while utilizing the latest in clean energy and efficient technologies from industry partners. Furthermore, the Air Force has ERCIP project candidates that provide climate/extreme weather resilience as an additional benefit, with 20+ more projects currently in early development stages with OEA. In total, these projects represent nearly \$1.3B in planned Air Force energy resilience investment.

The Air Force generally implements IDPs over years or decades. The plan, including any energy and climate resiliency aspects, is implemented through individual projects or related efforts

as funds are available. At Tyndall AFB, the Air Force has a unique opportunity to execute an IDP that incorporates the latest resiliency approaches across a majority of the installation in a few short years. Tyndall AFB is being reconstructed as an Installation of the Future and includes cutting-edge approaches to ensure the installation can withstand future climactic threats. Coastal resiliency is one of the most important aspects to the plan. This partnered approach includes cost-shared investments which combine with Air Force FSRM and MILCON investments to attenuate storm energy through natural infrastructure before it reaches built infrastructure. Key partners in these efforts include the Defense Advanced Research Projects Agency (DARPA), the United States Army Corps of Engineers Engineer Research and Development Center (USACE/ERDC), the Readiness and Environmental Protection Integration (REPI) Program, the National Oceanic and Atmospheric Administration (NOAA), Fish and Wildlife Service (FWS), Bay County, the Florida Department of Environmental Protection (FDEP), the University of Florida (UF), the Nature Conservancy (TNC), and the National Fish and Wildlife Foundation (NFWF). Several key low life-cycle cost Engineering with Nature (EWN) initiatives being explored include sand fencing, submerged shoreline stabilization, living shorelines, oyster reefs, and marsh and seagrass enhancements.

The built infrastructure is being designed and constructed using the latest UFCs. In addition, given the extensive level of damage, the Air Force made a policy decision to design beyond the minimum UFC criteria for civil and structural engineering. The minimum design wind speed being used for all new facilities at Tyndall AFB is 165 miles per hour, exceeding the highest wind speed captured during Hurricane Michael, and incorporates best practices from the Florida Building Code's High Velocity Hurricane Zone for Miami-Dade, Broward, and coastal Palm Beach Counties. Facilities are also being designed 14 to 19 feet above today's mean sea level, which incorporates a 7 foot predicted sea level rise scenario through the year 2100. The Air Force used the DoD Regional Sea Level (DRSL) database sea level rise scenarios to inform development of a Design Flood Elevation for reconstruction at Tyndall AFB. Using DRSL data, Air Force personnel generated spreadsheets and visualizations for several planning scenarios for future sea-level change, in combination with the 100-year floodplain elevation for Tyndall AFB. The site-specific Design Flood Elevation of 14 and 19 feet will ensure new facilities are built at an elevation above mean sea level that balances long-term risk aversion with minimal cost implications.

The Air Force is incorporating several efforts specifically targeted at increasing resiliency in the rebuild as well. Tyndall AFB is partnering with Gulf Power to install a micro-grid, which includes photovoltaic generation and a battery energy storage system, to provide back-up power to the First Air Force (1 AF) / Air Forces Northern (AFNORTH) compound. The 1 AF / AFNORTH HQ, plans, directs, and assesses air and space operations for the North American Aerospace Defense Command (NORAD), is currently unable to conduct uninterrupted operations should an outage occur. Another planned facility that directly enhances the Tyndall's resiliency is the Installation Resilience Operations Center (IROC). This capability will optimize facility operations for engineers and enhance situational awareness for first responders by improving the cybersecurity for sensors and other systems installed across the installation. Sensors installed on facilities across the installation will feed data into the IROC where it will be collected, analyzed, archived and distributed to various operations centers and base leaders to enhance the decision making process and integrate into existing AF business systems. Facility operations personnel will have improved visibility of the status and condition of installed equipment and first responders will have instantaneous awareness of incidents, such as active shooter situations, across the installation.

Black Start Exercises

The FY 2021 NDAA required the Services to conduct black start exercises to assess an installation's energy resilience and security. These exercises are designed to assess how well the installation can execute its primary missions should power be compromised. The Air Force executes these exercises, called Energy Resilience Readiness Exercises (ERRE), out of the Office of the Assistant Secretary for Installations, Environment, and Energy. To date the Air Force has conducted ERREs at Vandenberg AFB, California, Hanscom AFB, Massachusetts, and Joint Base McGuire-Dix-Lakehurst (JBMDL), New Jersey. These ERREs have been extremely helpful in identifying energy gaps and validating response plans. Specifically, the most recent ERRE at JBMDL revealed hidden interdependencies between the installation's electrical and communications architectures, identified issues with backup generation assets, and revealed a training gap with installation personnel. Installation leadership was also able to validate several continuity of operation plans could be executed during a power outage. The Air Force has plans to complete additional ERREs at Wright-Patterson AFB, Ohio, and Eielson AFB, Alaska, in 2021.

100-year Floodplains and Flood Risk Disclosure

In the FY 2019 NDAA, Congress directed OSD to update Department of Defense forms 1391 (DD 1391), *Military Construction Project Data*, submitted for each MILCON project to include a certification whether the project is located in a 100-year floodplain. The provision also required mitigation of flood risk for facilities that must be constructed in a 100-year floodplain due to mission requirements by following minimum flood mitigation requirements of the facility being cited two or three feet above floodplain level, depending on mission criticality of the facility. Following implementation guidance provided by OSD, all Air Force DD 1391s submitted with the FY21 President's Budget request complied with the 100-year floodplain disclosure mandate. Additionally, the Air Force is implementing floodplain mitigation plans for several notable MILCON projects. Three mission-critical campuses at Offutt AFB, which were destroyed by historic flooding in spring 2019, must be rebuilt in 100-year floodplains due to mission requirements. To mitigate flood risk for the Nuclear Command, Control and Communications (NC3), Non-kinetic Operations (NKO) and Security Forces campuses, approximately six hundred thousand cubic yards of fill material, or about forty thousand dump trucks, will be brought in. The elevation of the entire site will be raised to at least three feet above the 100-year floodplain. Though a significant effort, it will ensure personnel working out of these facilities can continue to execute this national strategic mission should Offutt AFB experience flooding in the future.

Authority to use O&M to replace buildings damaged/destroyed by storm

The Air Force has capitalized on the additional authority provided by Congress in the FY 2018 NDAA, which modified section 2854 of Title 10, United States Code, to authorize Service Secretaries to undertake projects to repair, restore, or replace a facility damaged or destroyed by a natural disaster or act of terrorism with available Operations and Maintenance (O&M) appropriations as opposed to MILCON appropriations. The Air Force is extremely thankful for this authority. It provides flexibility to more rapidly restore a facility and bring the mission it houses back online. The Air Force has used this authority at least six times since inception, most notably at Tyndall AFB following the destruction caused by Hurricane Michael in 2018. Four projects being executed with this authority at Tyndall AFB; the Air Battle Manager Simulator facility, a fire station, and two boat maintenance facilities for the Weapons Evaluation Group, will enable these organization to move out of temporary facilities and meet their organizational mission in a right sized facility more quickly.

Winter Storms of 2021

Recent extreme winter storms throughout much of the Midwest and southern United States had a considerable impact on DAF installations. Initial assessments indicate some degree of damage directly attributable to the storms at 28 installations. The Air Force continues to assess the damage and will restore facilities to full mission capability.

Though the intensity of recent winter storms was abnormal, Air Force installations proactively prepare for extreme weather. Some preparatory actions are considered just-in-time, such as winterization of facilities and adjustments to work schedules and shop manning levels. Others are routine and continual processes, such as maintenance of facilities and generators, coordination with local utility providers, and implementation of contingency plans. Preparatory actions also include longer-term infrastructure investment efforts to modernize and recapitalize infrastructure and execute projects to improve facility and energy resiliency.

The Air Force will continue to assess installation preparations and response actions related to these historic storms, but several overarching themes have already emerged.

A majority of the damage was the result of ruptured water or fire suppression lines due to freezing.

Not only must the damaged lines be repaired, so must the damage to the facility caused by flooding from broken pipes. When this occurs, water must be shut off to the facility until repairs are completed. Depending on the severity of water breaks, larger portions of the installation may be impacted as well. Prior to the storms, installations enacted just-in-time winterization measures in an attempt to limit damage. Some of these measures include ensuring facility doors and windows were secured to retain as much heat as possible, slow dripping faucets and running toilets to reduce stagnant water, which is more susceptible to freezing, and installing additional insulation on critical infrastructure such as water system pumps. These just-in-time preparations and winterization actions reduced utility system interruptions and damage, but did not eliminate it.

In many cases winterization actions, especially at installations in more southern locations where sub-freezing temperatures are uncommon, were simply not enough. Many facilities in these locations are not designed or constructed to handle sustained sub-freezing temperatures. Numerous facilities were constructed in accordance with building codes requiring less insulation than that required for facilities located in areas where cold is more common. Installations in Texas experienced the most significant water break issues, but this type of damage was not limited to the south. Installations in locations where harsh winter conditions are common start general facility

winterization in late fall, minimizing just-in-time preparations before anticipated abnormally cold weather. Many installations that are used to sustained sub-freezing temperatures, such as FE Warren AFB in Wyoming, Minot AFB in North Dakota, Malmstrom AFB in Montana, and Peterson AFB in Colorado, still experienced frozen water or fire suppression lines that caused damaged, just to a lesser degree.

Facility condition is another factor that led to damage. Degraded roofs, walls, windows, and doors can provide a pathway for moisture to enter the facility, which can freeze and further damage the facility. Degradation of these building components also can prevent the facility from retaining heat well, requiring heating systems to work harder to keep the facility warm. In many instances, degraded heating systems could not keep up and failed, leading to sub-freezing temperature within a facility and frozen water lines. The Air Force has continually accepted risk in installation investment leaving facilities and infrastructure in a degraded condition. Leveraging our long-term Infrastructure Investment Strategy (I2S), the Air Force is seeking to restore the condition of facilities and infrastructure and enhance resiliency by proactive upgrades through targeted facility investments informed by analytics, stabilized funding, application of evolving building codes, and improved processes such as more standardized building components through category management.

Coordination with utility providers, installation back-up power and water plans, and past infrastructure investments minimized the scope and impact of outages.

DAF installations rely on local utility providers as the primary source of power and water. As a result, if the community experiences interruptions during a storm, the base is also at risk of losing service. As installations are very much part of the surrounding communities, partnerships and working relationships with local utility companies are critical. Installations are constantly engaging with utility partners to ensure common understanding of needs, identify risks, find solutions which mutually benefit the installation and surrounding community, and synchronize response procedures should to interruptions or outages occur.

During the recent winter storms, several installations experienced limited power or water interruptions consistent with interruptions experienced by the local communities. Effective prior coordination helped minimize downtime. Several installations were able to effectively partner with local electrical power providers to minimize outages and mitigate impacts the installations. 72nd Air Base Wing Civil Engineer personnel at Tinker AFB communicated routinely with the local

electrical power provider prior to and during the storm to ensure continuity of operations. The team took extraordinary measures to reduce heat set points in facilities across the installation and monitor them throughout the storm. These efforts significantly reduced the installation's energy consumption helping the utility provider stabilize the power grid and minimize rolling blackouts. Additionally, Offutt AFB and Altus AFB, Oklahoma were each able to coordinate with the local electrical power provider to conduct electrical load curtailment by operating on-base back-up power plants. The efforts lowered the installations' demand on the local power grid, enabling the utility provider to better support surging demand in the community.

In addition to power and water provided by local utility companies, installations must have secondary sources to support mission critical operations should local supplies be interrupted. Secondary power is primarily provided by a combination of back-up generators installed on critical facilities and mobile generators which can be relocated as required to respond to changing conditions. Electrical power back-up plans were generally effective during the recent storms to minimize the impact of power interruptions to installations or localized outages on an installation. Several installations, including Minot AFB, Laughlin AFB, Texas, and Barksdale AFB, Louisiana, temporarily lost commercial power, but generators operated as designed to support mission requirements. One of the more critical instances where back-up generators ensured mission success was at Minot AFB. A portion of the missile field lost commercial power but back-up generators effectively kept the facilities operational until commercial power was restored.

Installations also maintain reserve water supplies, generally in buried or above ground tanks, in case of outages or emergencies and in some cases operate water wells as a secondary source. During recent storms, there were few instances where water supply to an installation was interrupted. There were numerous instances of localized outages which were caused by water distribution line breaks on installations or the need to shut off water to select facilities to address broken pipes due to freezing. With few exceptions, reserve water supplies were able to support mission critical operations. The most notable issue was at Dyess AFB, Texas. Due to an off-base power outage, which did not directly impact the installation, the city of Abilene was unable to provide water for 24 hours. The installation's emergency reserve water tanks were drained faster than expected due to numerous water line breaks in facilities around the installations. The installation was forced to turn off water when the emergency tanks reached 10% in order to preserve the remaining water for firefighting capabilities.

The Air Force has made effective past infrastructure investments, some in collaboration with utility providers, which have enhanced installation resiliency. Projects have been executed to specifically enhance power and water distribution infrastructure, install secondary or back-up power sources, and add redundancy to distribution systems through looped and cross-connected designs or connections to additional utility provider systems. Efforts to relocate overhead power lines underground in order to decrease the vulnerabilities of environmental conditions on the electrical distribution network have dramatically decreased power outages during wind or ice storms. Installation of back-fed circuits have allowed power to be re-routed in case of a localized outage or the need for maintenance or repair. Installations impacted by recent storms, such as Vance AFB, Oklahoma, Altus AFB, Little Rock AFB, Arkansas, Scott AFB, Illinois, Cannon AFB, New Mexico, and Grand Forks AFB, North Dakota, have invested significant funds over the last several years to enhance their electrical distribution systems by burying power lines and installing back-fed capabilities. Barksdale AFB is an example of an installation where connection to a secondary water provider paid off. When Barksdale's primary water source from Shreveport was compromised, the installation was able to switch to the city of Bossier, its back-up provider, for water. The redundancy provided by an alternate water supply minimized the length of a required boil water notice on Barksdale AFB.

Conclusion

Ready and resilient installations are at the core of Air Force mission success. Not only do we launch missions from our installations, they are the platform on which more than 330,000 active duty personnel organize, train, and equip and are home for thousands of Airmen, Guardians, and their families. Natural disasters and severe weather have impacted DAF installations across the world over the years and that threat is not going away. Tackling the current climate crisis is a matter of national security and the Air Force is committed to ensuring our installations are protected against the threats posed by deliberate, accidental, or naturally occurring events and that our personnel are able to respond and recover our installations should an event occur. We have learned and adapted after each impacting event and we are taking proactive action to enhance installation resilience across the enterprise.

The Air Force incorporates installation resilience in all aspects of operations, approaching it from four fronts: energy, cyber, infrastructure, and response. Energy, to include electricity, natural gas and water, is essential to mission accomplishment. Our focus is on secure the ability

to perform our warfighting mission in the face of disruptions to traditional energy sources while simultaneously optimizing availability and productivity through better planning and technology and process improvements. Our cyber resilience efforts, from an installations perspective, focus on preventing, detecting, and responding to unauthorized access to DAF facility-related control systems, such as those associated with power and water distribution, back-up generators, and HVAC systems. Infrastructure efforts ensure the installations themselves are ready now and in the future. Our focus is on limiting damage and recovery time following an event. We construct new and modernize existing facilities with the latest design codes, which are routinely updated to address climate and weather risks. The Air Force I2S guides investment decisions and business processes to restore the condition of our facilities and infrastructure so that they are better able to weather a storm. We are also embracing innovating approaches to natural infrastructure, capitalizing on partnerships with other government and non-government agencies to enhance installation resiliency.

The effectiveness of all of the planning and execution that goes into enhancing the resiliency of our installations is minimized if our more valuable resource, our people, are not ready to respond. Emergency management, disaster response, and continuity of operations planning is essential to ensure an installation and its people can respond and recover from an incident quickly while continuing to execute the mission or, in more extreme situations, minimizing downtime. Our holistic approach to installation resilience is what ensures the Air and Space Forces can provide timely and effective combat capability to the Joint Force.

Brigadier General John J. Allen Jr.

Brig. Gen. John Allen is the Commander, Air Force Civil Engineer Center, Air Force Installation and Mission Support Center, Air Force Materiel Command, Joint Base San Antonio-Lackland, Texas. He leads a 2,200-plus person organization, responsible for providing responsive, flexible full-spectrum installation engineering services. AFCEC missions include facility investment planning, design and construction, operations support, real property management, energy support, environmental compliance and restoration and readiness and emergency management. The unit conducts its operations at more than 75 locations worldwide. He also directly oversees the execution of \$11.8 billion in contracts, indirectly controls \$49 billion in contract vehicles and manages \$8 billion housing and \$5 billion Enhanced Use Lease portfolios on an annual basis.

Brig. Gen. Allen graduated from Virginia Tech in 1990. He entered active duty in 1992. He has served in a variety of squadron-level civil engineer assignments as well as at the wing, major command and Headquarters Air Force staff levels. In addition, he has commanded at the squadron, group and wing levels.

Prior to his current position, the general was the director of Civil Engineers, Deputy Chief of Staff for Logistics, Engineering & Force Protection, Headquarters U.S. Air Force.

EDUCATION

1990 Bachelor of Science, Civil Engineering, Virginia Tech, Blacksburg
 1997 Squadron Officer School, Maxwell Air Force Base, Ala.
 2000 Master of Engineering Management, University of Alaska Anchorage, Anchorage
 2003 Air Command and Staff College, Maxwell AFB, Ala., by correspondence
 2006 Master of Military Operational Art and Science, Air Command and Staff College, Maxwell AFB, Ala.
 2008 Air War College, Maxwell AFB, Ala., by correspondence
 2010 Master of National Security and Strategic Studies, U.S. Naval War College, Naval Station Newport, R.I.
 2014 Enterprise Leadership Seminar, University of North Carolina Kenan-Flagler Business School, Chapel Hill
 2018 Air Force Senior Leader Orientation Course, Joint Base Andrews, Md.
 2019 Capstone, National Defense University, Washington, D.C.

ASSIGNMENTS

January 1992—September 1995, Programmer and Readiness Flight Chief, 23rd Civil Engineer Squadron, Pope Air Force Base, N.C.
 December 1993—March 1994, Civil Engineer, 4404th Civil Engineer Squadron, King Abdul-Aziz Air Base, Dhahran, Saudi Arabia
 September 1995—September 1996, Maintenance Engineer, 8th Civil Engineer Squadron, Kunsan AB, South Korea
 October 1996—February 1998, Base Development Chief, 3rd Civil Engineer Squadron, Elmendorf AFB, Alaska
 March 1998—July 2000, Executive Officer, 3rd Wing, Elmendorf AFB, Alaska
 July 2000—June 2003, International Environmental Program Manager and Legislative Affairs Program Manager, Office of the Civil Engineer, Headquarters Air Force, the Pentagon, Arlington, Va.
 June 2003—July 2005, Operations Flight Commander, 1st Civil Engineer Squadron, Langley AFB, Va.
 July 2005—June 2006, Student, Air Command and Staff College, Maxwell AFB, Ala.
 June 2006—July 2007, Commander, 332nd Expeditionary Civil Engineer Squadron, Balad AB, Iraq
 July 2007—July 2009, Commander, 28th Civil Engineer Squadron, Ellsworth AFB, S.D.
 July 2009—June 2010, Student, U.S. Naval War College, Naval Station Newport, R.I.
 June 2010—July 2011, Chief, Programs Division, Office of the Civil Engineer, Headquarters Air Force, the Pentagon, Arlington, Va.
 August 2011—March 2012, Commander, 577th Expeditionary Prime BEEF Group, Bagram Airfield, Afghanistan

March 2012—August 2012, Commander, 1st Expeditionary Civil Engineer Group, Southwest Asia
 September 2012—April 2013, Senior Military Assistant, Assistant Secretary of the Air Force, Installations, Environment & Logistics, Headquarters Air Force, the Pentagon, Arlington, Va.
 April 2013—July 2015, Commander, 633rd Air Base Wing, Joint Base Langley-Eustis, Va.
 July 2015—June 2017, Chief, Senate Legislative Liaison, Office of the Secretary of the Air Force, the Pentagon, Arlington, Va.
 June 2017 - June 2018, Director of Staff, Air Force Materiel Command, Wright-Patterson AFB, Ohio
 June 2018—July 2020, Director of Civil Engineers, Deputy Chief of Staff, Logistics, Engineering and Force Protection, Headquarters U.S. Air Force, the Pentagon, Arlington, Va.
 July 2020—present, Commander, Air Force Civil Engineer Center, Air Force Installation and Mission Support Center, Air Force Materiel Command, Joint Base San Antonio-Lackland, Texas

MAJOR AWARDS AND DECORATIONS

Legion of Merit with two oak leaf clusters
 Bronze Star Medal with oak leaf cluster
 Meritorious Service Medal with four oak leaf clusters
 Air Force Commendation Medal with two oak leaf clusters
 Air Force Achievement Medal with device
 Meritorious Unit Award with oak leaf cluster
 Air Force Outstanding Unit Award with three oak leaf clusters
 Air Force Organizational Excellence Award
 National Defense Service Medal with two oak leaf clusters
 Southwest Asia Service Medal with oak leaf cluster
 Afghanistan Campaign Medal
 Iraq Campaign Medal
 Global War on Terrorism Service Medal
 Korean Defense Service Medal

EFFECTIVE DATES OF PROMOTION

Second Lieutenant Jan. 15, 1992
 First Lieutenant July 7, 1993
 Captain July 7, 1995
 Major May 1, 2002
 Lieutenant Colonel March 1, 2006
 Colonel Aug. 1, 2011
 Brigadier General June 8, 2018

(Current as of August 2020)

QUESTIONS SUBMITTED BY MEMBERS POST HEARING

MARCH 26, 2021

QUESTIONS SUBMITTED BY MR. BERGMAN

Mr. BERGMAN. How can the Department as a whole better utilize new building technologies like cross-laminated timber? What authorities or guidance do you need from Congress that would further increase the partnership between each of your respective services and the mass timber industry? How can we ensure technologies like cross-laminated timber are incorporated into new construction going up in the immediate future, as opposed to waiting for it to weave in across the FYDP, especially as we re-build installations impacted by extreme weather events?

General GABRAM. [No answer was available at the time of printing.]

Mr. BERGMAN. How can the Department as a whole better utilize new building technologies like cross-laminated timber? What authorities or guidance do you need from Congress that would further increase the partnership between each of your respective services and the mass timber industry? How can we ensure technologies like cross-laminated timber are incorporated into new construction going up in the immediate future, as opposed to waiting for it to weave in across the FYDP, especially as we re-build installations impacted by extreme weather events?

Admiral LINDSEY. [No answer was available at the time of printing.]

Mr. BERGMAN. How can the Department as a whole better utilize new building technologies like cross-laminated timber? What authorities or guidance do you need from Congress that would further increase the partnership between each of your respective services and the mass timber industry? How can we ensure technologies like cross-laminated timber are incorporated into new construction going up in the immediate future, as opposed to waiting for it to weave in across the FYDP, especially as we re-build installations impacted by extreme weather events?

General BANTA. [No answer was available at the time of printing.]

Mr. BERGMAN. How can the Department as a whole better utilize new building technologies like cross-laminated timber? What authorities or guidance do you need from Congress that would further increase the partnership between each of your respective services and the mass timber industry? How can we ensure technologies like cross-laminated timber are incorporated into new construction going up in the immediate future, as opposed to waiting for it to weave in across the FYDP, especially as we re-build installations impacted by extreme weather events?

General ALLEN. [No answer was available at the time of printing.]

QUESTION SUBMITTED BY MR. KAHELE

Mr. KAHELE. The Barking Sands Tactical Underwater Range (BARSTUR) Range is a critical part of the Pacific Missile Range Facility (PMRF) complex. Its unique and strategic location off Kauai plays an essential role in providing realistic training operations to prepare the fleet for engagements in the Pacific theater of operations. The range allows training and tactical development providing the fleet with a premier facility for crew certification and training enhancing critical readiness of the fleet in the Pacific and worldwide. Right now, roughly 30% of BARSTUR's in-water sensors (12 of 42 in-water sensors) are inoperable due to the aging infrastructure. It is one bad storm away from additional sensors being compromised. Given this serious threat to the readiness of the fleet, will the Navy prioritize and accelerate funding towards underwater communications infrastructure projects to prevent potential loss of undersea warfare training capability?

Admiral LINDSEY. [No answer was available at the time of printing.]

