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Feature Report

“A Strategic Vision for Biological Threat Reduction: The U.S. Department of Defense and Beyond (2020)”. Published by The National Academies Press (National Academies of Science Engineering Medicine)

<https://www.nap.edu/catalog/25681/a-strategic-vision-for-biological-threat-reduction-the-usdepartment>

Contributors

National Academies of Sciences, Engineering, and Medicine; Policy and Global Affairs; Committee on International Security and Arms Control; Committee on Enhancing Global Health Security through International Biosecurity and Health Engagement Programs

Description

The National Academies of Sciences, Engineering, and Medicine was asked to articulate a 5-year strategic vision for international health security programs and provide findings and recommendations on how to optimize the impact of the Department of Defense (DOD) Biological Threat Reduction Program (BTRP) in fulfilling its biosafety and biosecurity mission. Because BTRP is just one of several U.S. government programs conducting international health security engagement, both the strategic vision and the success of the program rely on coordinating actions with the U.S. government as a whole and with its international partners. This report provides several recommendations for optimizing BTRP success in its current mission and the wider-looking strategic vision it proposes.

Topics

Conflict and Security Issues — Biosecurity

Conflict and Security Issues — Prevention, Security and Response

Conflict and Security Issues — Policy, Reviews and Evaluations

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NUCLEAR WEAPONS

Associated Press via Defense News (Washington, D.C.)

US Must Move ahead with Work on Nukes, says Nuclear Security Boss

By Susan Montoya Bryan, The Associated Press

May 6, 2020

ALBUQUERQUE, N.M. — A top nuclear security official says the U.S. must move ahead with plans to ramp up production of key components for the nation's nuclear arsenal despite the challenges presented by the coronavirus.

Federal officials have set a deadline of 2030 for increased production of the plutonium cores used in nuclear weapons. The work will be split between Los Alamos National Laboratory in New Mexico and the Savannah River Site in South Carolina. At stake are jobs and billions of federal dollars to upgrade buildings or construct new factories.

National Nuclear Security Administrator Lisa Gordon-Hagerty said in recent letter to U.S. Sen. Tom Udall, D-N.M., that her agency has worked with the contractor that manages Los Alamos on precautions to protect employees from the virus while moving ahead with defense work.

“The plutonium pit production mission is one of our highest national security priorities and is being done in accordance with congressional direction,” she wrote. “We must press forward with this project in order to meet Department of Defense deliverables.”

Gordon-Hagerty didn’t specify what steps were taken to safeguard workers. Los Alamos director Thom Mason has said more than 85 percent of the laboratory’s workforce is working from home and measures “following CDC guidelines” are in place for those doing national security work and protecting the lab.

Watchdog groups have called for a more in-depth look at the plutonium core project at Los Alamos, but the National Nuclear Security Administration rejected those efforts earlier this year. The agency opted to prepare a supplemental analysis of an environmental review done for Los Alamos more than a decade ago. Critics argue that ramping up production at the lab goes beyond those initial plans and should be reexamined.

The agency is doing a separate review for Savannah River. A virtual public meeting on that part of the project was held last week and people can give input on it until May 18.

Gordon-Hagerty denied a request by New Mexico’s congressional delegation to give the public more time to weigh in on the Los Alamos project. People can comment until Saturday. Lawmakers had asked on behalf of dozens of groups for an extension until at least June 19.

“The NNSA is essentially telling the public to get lost during this epidemic,” said Jay Coghlan, director of Nuclear Watch New Mexico, a watchdog group.

He said people should use the public comment opportunities to demand the government spend money on masks, ventilators and other needs related to the pandemic rather than on nuclear weapons.

Officials for years have pushed for plutonium core production to resume, saying the U.S. needs to ensure the stability and reliance of its nuclear arsenal.

The National Nuclear Security Administration has said most of the cores in the stockpile were produced in the 1970s and 1980s. <https://www.defensenews.com/smr/nuclear-arsenal/2020/05/06/us-must-move-ahead-with-work-on-nukes-says-nuclear-security-boss/>

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Arms Control Today (Washington, D.C.)

Coronavirus Affects U.S. Nuclear Forces

By Kingston Reif

May 2020

As the coronavirus pandemic continues to sweep the nation, the Defense Department is taking special measures to ensure the continued readiness of U.S. nuclear forces.

Department officials have expressed confidence that these steps have helped to ensure that the virus does not compromise the ability of the nuclear arsenal to perform its intended mission.

But over time, the rising human and financial toll inflicted by the disease could exacerbate the affordability and execution challenges facing the government’s ambitious plans to sustain and modernize U.S. nuclear delivery systems and warheads and their supporting infrastructure. (See ACT, March 2020.)

Adm. Charles Richard, the commander of U.S. Strategic Command, told reporters March 17 that “our strategic nuclear forces remain ready to execute the nation's strategic deterrence mission” and “to this point, we have had no impact to our ability to accomplish our mission.”

In the ensuing weeks, Pentagon officials have detailed some of the protocols that have been put in place to safeguard the health of U.S. military personnel that operate nuclear delivery systems.

Gen. Mark Milley, the chairman of the Joint Chiefs of Staff, said on April 14 that the crews of 12 deployed ballistic missile submarines “are going into isolation” for 14 days and “are being tested prior to setting sail, as tests become available.”

The Air Force has also adjusted “operations in the nuclear missile fields,” Gen. David Goldfein, the chief of staff of the service, told Air Force Magazine on April 15.

Goldfein said that the crews for Minuteman III intercontinental ballistic missiles (ICBMs) are now spending 14 days or more at their posts, compared to two or three days at a time previously. All of the roughly 400 deployed U.S. ICBMs are maintained in a state of launch-ready alert, meaning they can be launched within minutes of a decision by the president to do so.

“We’re operating in what we call the new abnormal, operating with the virus,” Goldfein said. He told reporters during a virtual press conference on April 22 that no ICBM or nuclear bomber crews have tested positive for the virus.

The Pentagon announced that day that it is instituting a tiered system for testing personnel for the virus, with top priority given to personnel supporting “critical national capabilities like...our nuclear deterrent.”

“I’m knocking on wood right now [but] so far our measures are working,” Lt. Gen. Anthony Cotton, deputy commander of Global Strike Command, told Politico on April 23. “We’re still flying sorties, the ICBM forces are still on 24 hours, we’re still doing training.”

As of the end of April, the Defense Department reported nearly 7,000 total cases of the coronavirus among department personnel, dependents, and contractors had tested positive for the coronavirus, with hundreds of new cases being reported every day.

The Pentagon in late March stopped reporting the number of positive cases at individual bases and installations. As of early April, more than 150 bases in 41 states had positive cases, including nearly every base that hosts U.S. nuclear delivery systems, according to an April 9 Newsweek report.

The Energy Department’s semiautonomous National Nuclear Security Administration (NNSA) reported 40 active cases of the virus at the agency as of the end of April. Nearly all NNSA production facilities had reduced to a minimum mission-critical level of operations as of mid-April, Exchange Monitor Publications reported on April 10. Mission-critical employees include the personnel needed to assemble nuclear weapons and components, maintain key infrastructure, or provide security.

Although U.S. nuclear forces personnel to have largely avoided the virus, the threat to worker safety and health posed by the disease is straining the defense industrial base and is likely to prompt schedule delays to major defense acquisition programs.

Ellen Lord, undersecretary of defense for acquisition and sustainment, told reporters on April 20 that the Defense Department is “seeing the greatest impacts in the aviation supply chain, shipbuilding, and small space launch.”

She added that the department projects “about a three-month slowdown at slower rates in terms of execution” for major acquisition programs and is “just now looking at key milestones that might be impacted.”

Lord said the Pentagon is planning to ask Congress for “billions and billions” in additional funding as part of a future emergency stimulus package for fiscal year 2020 to address possible schedule delays.

Congress provided the Defense Department with \$10.5 billion in emergency supplemental funds as part a \$2.2 trillion stimulus bill signed by President Donald Trump in March. The additional funding brought total appropriations for national defense in fiscal year 2020 to \$756.5 billion.

The potential impact of workforce and supplier slowdowns on the Pentagon’s nuclear delivery system modernization programs remains to be seen.

“We are confident the services, along with industry partners, are able to keep production related to modernization of our nuclear forces on track, while taking appropriate precautions to keep their workforces safe and healthy,” Richard said in March.

But the Congressional Research Service warned in March that the risks of delays at shipyards could be particularly problematic for the program building a new fleet of Columbia-class ballistic missile submarines, due in part to the “tight schedule for designing and building the lead boat.”

Meanwhile, the Air Force is slated to award a contract to Northrop Grumman to begin development of a new ICBM system via the Ground-Based Strategic Deterrent (GBSD) program before the end of the summer. (See ACT, October 2019.)

Will Roper, the assistant secretary of the Air Force for acquisition, technology, and logistics, said on April 16 that the Air Force might actually award the GBSD development contract earlier than planned.

At the NNSA, major warhead and infrastructure modernization programs are continuing as planned, a congressional source told Arms Control Today.

In the longer term, many prominent defense experts believe that the financial havoc wreaked by the coronavirus will prompt reductions in military spending. Such cuts could increase the financial burden of the Trump administration’s nuclear modernization plans.

The administration is requesting \$44.5 billion in fiscal year 2021 for nuclear weapons sustainment and modernization, an increase of about \$7.3 billion, or 19 percent, from the fiscal year 2020 level.

Kori Schake, director of foreign and defense policy studies at the American Enterprise Institute, predicted on April 6 that “we are going to see enormous downward pressure on defense spending because of other urgent American national needs like health care that the pandemic is going to raise.”

Pentagon officials, however, maintain that nuclear modernization will remain a top priority even amid declining defense budgets.

“As the budget comes down, there will be more tough choices ahead,” Roper said. “My worry—concern—is less about any program in the nuclear triad. It’s more outside of that: Where would we find that bill payer?”

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Air Force Magazine (Arlington, Va.)

AFGSC's New Plan to Deploy Bombers Across the Globe

By Brian W. Everstine

April 29, 2020

Air Force Global Strike Command will regularly rotate a small number of bombers to the Pacific and Middle East theaters to maintain a regular deterrence presence and to conduct combat operations as needed, but it will no longer operate out of bases such as al-Udeid Air Base, Qatar, or Andersen Air Force Base, Guam, for extended periods. The move keeps USAF strategically relevant and operationally unpredictable, AFGSC boss Gen. Timothy Ray said during an AFA Mitchell Institute for Aerospace Studies virtual event April 29.

The sixteen-year-old "Continuous Bomber Presence" at Andersen Air Force Base, Guam, ended April 16 as the 69th Bomb Squadron returned home to Minot Air Force Base, N.D. Two weeks earlier, the 20th Bomb Squadron returned to Barksdale Air Force Base, La., from a four-month deployment to the Middle East, which included combat sorties and establishing a presence in the region to deter Iran.

"We can come and go anytime they need us, we don't need to be there physically," Ray said.

Changing Bases in the Middle East

The January attack on U.S. forces at al-Asad Air Base inside Iraq, showed that Iran's proxy forces are capable of attacking as far as Saudi Arabia, prompting the the Air Force to move its strategic bomber deployment further away, to Diego Garcia in the Indian Ocean. Since 2001, USAF has depended on al-Udeid to host bomber deployments. It even expanded the runway there in 2016 to allow B-52s to deploy to the base for the first time in 25 years. However, the operational reality in the Middle East has forced the Air Force to change how it operates.

Iran's ability to attack al-Udeid was long known, though recent actions have shown the country's willingness to do so.

"It didn't take al-Asad for me to see that you don't want to park your strategic assets in the ballistic missile engagement zone, we've thought like that for a long time," Ray said.

Al-Udeid was a convenient location for bombers to support counter terrorism operations in Afghanistan as well as Iraq and Syria. The base in Diego Garcia has supported bomber operations, but not at the same scale or for an extended period of time.

"We just moved closer to save gas," Ray said about having bombers in Qatar. "But when the operational reality enters the equation, you can easily step back and still cover the targets."

The 20th Bomb Squadron did just that with its recent deployment, which started the same day that Iran attacked al-Asad. While they were assigned to the 379th Air Expeditionary Wing at al-Udeid, they operated from Diego Garcia and flew more than 90 sorties totaling 1,300 combat hours from the base. The B-52s were able to meet 100 percent of their air tasking order requirements, according to an Air Forces Central Command release.

The Air Force is not ruling out al-Udeid for future bomber deployments, or other bases inside the "threat ring" of adversary ballistic missiles, 8th Air Force Commander Maj. Gen. James Dawkins told Air Force Magazine in March. The preference is to avoid those threats, but "we will deploy where needed to bring the capabilities required," he said.

“With more adversaries acquiring ballistic missile capabilities, we have to balance force protection measures to mitigate our exposure to these threats when we have strategic assets deployed to any base,” he said.

Because the bombers will not be permanently stationed in the Middle East, they aren’t regularly available for air tasking orders to conduct daily strikes. However, Ray said the Global Strike air operations center is in regular coordination with the combined air operations center at al-Udeid, along with others across the globe, so “the integration of air across those boundaries is second nature,” he said.

An example of this took place in October 2019, after Iranian-backed Houthi rebels used drones to strike oil facilities within Saudi Arabia. Ray and Air Forces Central Command boss Lt. Gen. Joseph Guastella brainstormed a response to show U.S. strength and deter Iran. As a result, two B-1Bs made an unannounced flight directly from Ellsworth Air Force Base, S.D., to Prince Sultan Air Base in Saudi Arabia. The bombers landed, reset, and flew a “presence mission” in the Persian Gulf, and then returned home.

“And it worked brilliantly,” Ray said. “So you can generate those kinds of things.”

While the bombers have a longer route to fly, these sorties can be planned and flown quickly.

“The further we deploy from a given fight means longer flight times and in some cases tanker support,” Dawkins said. “Bombers bring range, persistence, and precision to any fight.” B-1s in the Pacific

When the 69th Bomb Squadron left Andersen, it brought an end to the basing of bombers in the Pacific, which USAF had done since 2004. While the Air Force almost immediately sent B-1s back to the area in direct flights from the U.S., there has not been a nuclear bomber presence in the Pacific since the decision was made to end the Continuous Bomber Presence.

Ray said for the immediate time being, that will remain. Up until this month, two of the service’s four B-52 squadrons had been deployed and they need time to “reset.” B-1s bring a different capability, including the ability to fly faster and carry other types of weapons that are important in the region. Lancers carry AGM-158C Long-Range Anti-Ship Missiles and AGM-158B Joint Air-to-Surface Standoff Missile-Extended Range missiles, “and I think you’ll see that it has great operational benefit to our partners and allies,” he said.

“We will bring nuclear bombers into the theater on a regular basis,” Ray said. “The B-52s are simply resetting, [so] the B-2s are picking up a little bit more of the load. B-2s will come out episodically.” It’s also just easier for the Air Force to send B-1s because they are conventional.

“There’s a few people who get a little alarmed when you bring a nuclear bomber into their airspace,” Ray said. “We look at the B-1 as a great capability: I can land it in a lot of places physically that I can’t land a B-52, and I can operate with more people. So we’re going to feature that a little bit more in the Pacific.”

Now that all bomber squadrons are based in the United States, where they have simulators and access to ranges that aren’t available while deployed, they will soon be “in very good shape” and be available for additional long-distance direct flights and small task force rotations, Ray said.

“You’ll see all three bombers operating in the Pacific,” he said.

<https://www.airforcemag.com/afgcs-new-plan-to-deploy-bombers-across-the-globe/> [Return to top](#)

Air Force Magazine (Arlington, Va.)

Esper's Approach to Flat Budgets Mirrors USAF, Keeps Nukes a Priority

By John A. Tirpak

May 6, 2020

Defense Secretary Mark Esper's spending priorities under expected flat budgets mirror those of the Air Force in the fiscal 2021 budget: sacrifice legacy hardware to pay for modernization. He also won't back off from the massive program to modernize the strategic arsenal.

During a May 5 Pentagon press briefing Esper was asked what programs would be vulnerable if high government spending on the coronavirus pandemic suppresses defense spending.

"Frankly, my inclination is not to risk any ... modernization programs," Esper replied. His preference is to "pull out more of the legacy programs" instead.

"We need to move away from legacy," Esper continued, and "invest those dollars in the future." There are "dozens" of legacy programs he thinks are ripe to be discontinued across the services—though he did not identify any in particular—adding "that's where I would start" in any budget reduction planning.

The Air Force has come under fire for just this approach, having offered up B-1 bombers, A-10 attack jets, and numerous aerial tankers for retirement in the fiscal 2021 budget, with the aim of using the resulting savings to develop the joint all-domain command and control system and other modernization programs.

Esper acknowledged that his approach likely entails some "near-term risk," but said this is necessary given the technological "trajectory" of China now and Russia "in the coming years" in rapidly fielding advanced weapons.

He also won't "risk the strategic deterrent" by reducing spending on nuclear weapons modernization, saying it remains the highest priority.

Air Force Chief of Staff Gen. David Goldfein, explaining USAF's fiscal 2021 budget priorities in January, said the spending plan would create some "real-time, near-term risk," but the payoff would be a war-winning inter-service connectivity through JADC2. Goldfein noted that the Air Force actually wanted to pare its legacy capabilities down even further than the \$30 billion worth included in the budget submission, but "we didn't get everything we wanted" in late 2019 internal budget deliberations over which Esper presided.

Goldfein has since said that multiple wargames show that only with JADC2 does the joint force win in the "most stressing scenarios," and that a smaller but more modern force does better than a larger force comprised mostly of older gear.

<https://www.airforcemag.com/espers-approach-to-flat-budgets-mirrors-usaf-keeps-nukes-a-priority/>

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US COUNTER-WMD

Sandia National Laboratories (Livermore, Calif.)

Radiation-detecting Plastic Gets Ingredient to Stay in the Clear

By Sandia Labs

April 30, 2020

LIVERMORE, Calif. — Researchers at Sandia National Laboratories have identified a straightforward change to the formula for radiation-detecting plastic. The change prevents “fogging,” which reduces the lifetime of the plastics used to detect nuclear material transiting through the U.S. Department of Homeland Security’s radiation detectors.

Nick Myllenbeck, a materials scientist at Sandia National Laboratories, examines glowing plastic used to detect radioactive material. (Photo by Lloyd Wilson) Click on the thumbnail for a highresolution image.

The change also fits well into existing manufacturing processes for the plastic, so manufacturers have been able to scale up production rapidly to make large sheets capable of replacing fogged detectors.

These radiation detectors are sheets of polyvinyltoluene (PVT) plastic, 2 inches thick and 6 to 8 feet high, deployed in traffic lanes at ports of entry. The detection component in the plastic is a fluorescent molecule that glows when radiation hits the material. Light collectors mounted on the top of the sheet gather light from the glowing molecules; the amount of light they register reflects the amount and energy of radiation that hit the material, the number of light particles coming from the fluorescent molecule and the efficiency of light transport through the plastic.

“For reliable radiation measurements, it’s of the utmost importance that the material is optically transparent and remains that way for decades,” Sandia materials scientist Nick Myllenbeck said.

However, analysts that use PVT noticed that the radiation detection performance of the plastic was starting to degrade after the plastic had spent a few years in the field. By eye, they saw what appeared to be fog droplets forming inside the material. These droplets scattered light from the glowing molecules and prevented some of the light from reaching the detectors, reducing the detector’s sensitivity over time.

Microscopy reveals fog source

To figure out how to prevent this fogging, Sandia researchers, working with colleagues at Lawrence Livermore, Pacific Northwest and Oak Ridge national laboratories, first needed to know how the fog formed. They suspected it appeared in the material much like it does in air — by water condensing as the air temperature drops overnight.

The researchers put small samples of the radiation-detecting PVT plastic in a humid chamber and cycled the temperature from warm to cool to mimic daytime and nighttime temperatures. The samples absorbed only about 0.03% water by mass, but during cooling cycles, the researchers saw the fog-like droplets appear in the material.

When they examined the material under an optical microscope, however, they realized the droplets were microscale defects in the plastic caused by condensed water absorbed from the air.

They eventually realized that the defects formed in two phases. During the first few warm and cool cycles, the fog-like defects appear to be completely reversible upon heating or drying out the plastic. However, if the water remains in the plastic and the material experiences enough temperature cycles, the defects grow and become permanent. Both defect types can adversely affect the performance of plastic scintillators in the field, Myllenbeck noted.

Non-fogging formula easy for manufacturers to produce at scale

Once the researchers knew how the fog formed, they hypothesized that they could add a chemical component to the plastic to keep water from forming defects inside. Materials scientists from Sandia and Lawrence Livermore, sharing funding from the Department of Homeland Security Countering Weapons of Mass Destruction Office, experimented with various additives to stabilize water by means of hydrogen bonding to the additive.

At Sandia, Myllenbeck and his colleagues started with the current PVT formula and added one ingredient: a commercially-available additive that can interact favorably both with water and the plastic matrix. When they tested the new material under accelerated temperature and humidity conditions, the researchers did not see any sign of fogging after tens of cycles. In contrast, the standard plastic would fog severely after just one cycle. Myllenbeck suspects that the water inside the plastic clings to the additive rather than to other water molecules, which prevents droplet formation, and thus light scattering defects.

“This one ingredient change is a huge advantage to manufacturers,” he said. “They only have to add a small amount of this compound to their existing formula, with minor process modifications, to produce a nonfogging material that performs identically to the existing plastic.”

As a demonstration of scalability, a property that had previously eluded the multi-lab team, a PVT manufacturer working with the multilab team has produced numerous 2/3-scale parts with the new formula. They plan in the next several months to make full-scale panels suitable for field deployment, Myllenbeck added.

Sandia National Laboratories is a multimission laboratory operated by National Technology and Engineering Solutions of Sandia LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy’s National Nuclear Security Administration. Sandia Labs has major research and development responsibilities in nuclear deterrence, global security, defense, energy technologies and economic competitiveness, with main facilities in Albuquerque, New Mexico, and Livermore, California.

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https://share-ng.sandia.gov/news/resources/news_releases/plastic_fogging/

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C4ISRNET (Vienna, Va.)

The Next Test of the Air Force’s Advanced Battle Management System is Delayed Again

By Valerie Insinna

May 5, 2020

The Air Force won’t be holding a second round of experiments for the Advanced Battle Management System until at least August or September, the head of U.S. Northern Command said Monday.

The Air Force had hoped to conduct another set of demonstrations for its next-generation command-and-control system in June, after the onset of the novel coronavirus pandemic prompted the service to delay the May event. However, continued disruption has pushed off the event a little further, said Gen. Terrence O’Shaughnessy.

“We’re still super excited about it,” O’Shaughnessy said of the exercises. “We’re going to do the same thing, but just taking an even broader perspective.”

The Air Force conducted the first demonstration of the Advanced Battle Management System in December, using a number of operational platforms — including F-35 Joint Strike Fighters, F-22 jets and the Navy destroyer Thomas Hudner — to test a number of experimental technologies meant to allow the services to more seamlessly connect and share data.

U.S. Northern Command participated in the scenario, which involved the U.S. military having to defend the United States against a simulated cruise missile attack. It will also play a major role in the second wave of experiments, with U.S. Strategic Command and U.S. Space Command added to the list of players.

The U.S. military wants to be able to network all of its platforms together, enabling them to immediately transmit data and automatically cue weapons to target an adversary — a concept it calls Joint All Domain Command and Control. The Air Force conceives the Advanced Battle Management System as the key group of technologies that will enable JADC2.

O’Shaughnessy said the upcoming Advanced Battle Management System experiments could help the joint force better understand how the technology works, as opposed to being “a bunch of PowerPoint charts with lightning bolts and things on it.”

“Part of my intent from here, from NORTHCOM, is to really show the value to the joint force of what JADC2 can bring. And we do have some pretty good [advocacy] that we see not just in the Air Force, but growing in some of the other services as well,” he said.

<https://www.c4isrnet.com/c2-comms/2020/05/05/the-next-test-of-the-air-forces-nextgeneration-battle-management-system-is-delayed-again/>
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Lawrence Livermore National Laboratory (Livermore, Calif.)

Second Skin Protects against Chem, Bio Agents

By Anne M. Stark

May 6, 2020

Recent events such as the COVID-19 pandemic and the use of chemical weapons in the Syria conflict have provided a stark reminder of the plethora of chemical and biological threats that soldiers, medical personnel and first responders face during routine and emergency operations.

Personnel safety relies on protective equipment which, unfortunately, still leaves much to be desired. For example, high breathability (i.e., the transfer of water vapor from the wearer’s body to the outside world) is critical in protective military uniforms to prevent heat-stress and exhaustion when soldiers are engaged in missions in contaminated environments. The same materials (adsorbents or barrier layers) that provide protection in current garments also detrimentally inhibit breathability.

To tackle these challenges, a multi-institutional team of researchers led by Lawrence Livermore National Laboratory (LLNL) scientist Francesco Fornasiero has developed a smart, breathable fabric designed to protect the wearer against biological and chemical warfare agents. Material of this type could be used in clinical and medical settings as well. The work was recently published online in *Advanced Functional Materials* and represents the successful completion of Phase I of the project, which is funded by the Defense Threat Reduction Agency through the Dynamic Multifunctional Materials for a Second Skin "D[MS]2" program.

"We demonstrated a smart material that is both breathable and protective by successfully combining two key elements: a base membrane layer comprising trillions of aligned carbon nanotube pores and a threat-responsive polymer layer grafted onto the membrane surface," Fornasiero said.

These carbon nanotubes (graphitic cylinders with diameters more than 5,000 times smaller than a human hair) could easily transport water molecules through their interiors while also blocking all biological threats, which cannot fit through the tiny pores. This key finding was previously published in *Advanced Materials*.

The team has shown that the moisture vapor transport rate through carbon nanotubes increases with decreasing tube diameter and, for the smallest pore sizes considered in the study, is so fast that it approaches what one would measure in the bulk gas phase. This trend is surprising and implies that single-walled carbon nanotubes (SWCNTs) as moisture conductive pores overcome a limiting breathability/protection trade-off displayed by conventional porous materials, according to Fornasiero. Thus, size-sieving selectivity and water-vapor permeability can be simultaneously enhanced by decreasing SWCNT diameters.

Contrary to biological agents, chemical threats are smaller and can fit through the nanotube pores. To add protection against chemical hazards, a layer of polymer chains is grown on the material surface, which reversibly collapses in contact with the threat, thus temporarily blocking the pores.

"This dynamic layer allows the material to be 'smart' in that it provides protection only when and where it is needed," said Timothy Swager, a collaborator at the Massachusetts Institute of Technology who developed the responsive polymer. These polymers were designed to transition from an extended to a collapsed state in contact with organophosphate threats, such as sarin. "We confirmed that both simulants and live agents trigger the desired volume change," Swager added.

The team showed that the responsive membranes have enough breathability in their open-pore state to meet the sponsor requirements. In the closed state, the threat permeation through the material is dramatically reduced by two orders of magnitude. The demonstrated breathability and smart protection properties of this material are expected to translate in a significantly improved thermal comfort for the user and enable to greatly extend the wear time of protective gears, whether in a hospital or battlefield.

"The safety of warfighters, medical personnel and first responders during prolonged operations in hazardous environments relies on personal protective equipment that not only protects but also can breathe," said Kendra McCoy, the DTRA program manager overseeing the project. "DTRA Second Skin program is designed to address this need by supporting the development of new materials that adapt autonomously to the environment and maximize both comfort and protection for many hours."

In the next phase of the project, the team will aim to incorporate on-demand protection against additional chemical threats and make the material stretchable for a better body fit, thus more closely mimicking the human skin.

LLNL researchers Chiatai Chen, Eric Meshot, Steven Buchsbaum, Ngoc Bui, Melinda Jue, Sei Jin Park, Carlos Valdez, Saphon Hok and Kuang Jen Wu also contributed to this work, as well as collaborators at Massachusetts Institute of Technology (Yifan Li, Myles Herbert, Rong Zhu, Oleg Kulikov, Ben McDonald, Qilin He) and the U.S. Army Combat Capabilities Development Command - Soldier Center (Christopher Doona). <https://www.llnl.gov/news/second-skin-protects-against-chem-bio-agents>
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US ARMS CONTROL

Business Insider (New York, N.Y.)

Satellite Images Reveal North Korea is Building a Giant Facility Which Could Hold Nuclear Missiles Capable of Hitting the United States

By Thomas Colson

March 7, 2020

North Korea has almost completed construction of a giant facility large enough to hold nuclear missiles capable of reaching the United States, according to a new analysis of satellite photography.

The facility "is almost certainly related to North Korea's expanding ballistic missiles program," according to the analysis by the Center for Strategic and International Studies, a Washington-based think tank.

One building within the facility "is large enough to accommodate an elevated Hwasong-15 intercontinental ballistic missile and, therefore, the entirety of North Korea's known ballistic missile variants," the report states.

CSIS suggests the facility is located 11 miles north-west of Pyongyang and features an underground storage facility large enough to house all known North Korean ballistic missiles as well as their support vehicles. The site's existence had not previously been disclosed.

It also features an "unusually large" covered rail terminal, which could be used to transport missiles and supporting equipment, and interconnected buildings designed for drive-through access, the report states.

The site is also relatively close to ballistic component manufacturing plants near Pyongyang.

"Taken as a whole, these characteristics suggest that this facility is likely designed to support ballistic missile operations and for the interim is identified as the Sil-li (신리) Ballistic Missile Support Facility," said Joseph Bermudez, the report's author.

"As such, it is another component of the North Korean ballistic missile infrastructure that has been undergoing both modernization and expansion during the past 10 years."

North Korea debuted its most powerful ballistic missile, the Hwasong-15, in 2017, which experts say could reach "any part of the continental United States."

Donald Trump has since met with Kim Jong Un on three occasions as he tried to broker a deal designed to halt North Korea's nuclear missile program.

But talks between the two powers broke down in February last year at a summit in Hanoi, Vietnam.

Trump was said to have handed Kim Jong Un a piece of paper which included a blunt call for the transfer of Pyongyang's nuclear weapons and bomb fuel to the United States in return for the lifting of economic sanctions.

A lunch between the two leaders was subsequently cancelled, and a North Korean official subsequently accused the US of issuing "gangster-like" demands, heralding a significant cooling in relations since.

<https://www.businessinsider.com/satellite-images-north-korean-nuclear-missile-base-kim-jongun-2020-5>

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Middle East Monitor (London, U.K.)

Iran: Trump Will Regret Withdrawing from Nuclear Deal

By Middle East Monitor

May 7, 2020

Iranian President Hassan Rouhani said yesterday that US President Donald Trump will regret withdrawing from the 2015 nuclear agreement, IRNA news agency reported.

"Extremists in America as well as Israel have succeeded in persuading Trump to exit the nuclear agreement, believing that Iran would also withdraw, but Iran is committed to the agreement," Rouhani said during a cabinet meeting, adding that under the agreement the UN arms embargo imposed on Iran will be lifted in October.

The president reiterated that lifting the arms embargo imposed on Iran is part of Resolution 2231, and therefore implementing it is the country's legitimate right.

In 2018, Washington unilaterally withdrew from the Joint Comprehensive Plan of Action of (JCPOA) signed between Tehran and the six world powers, which aimed to curb Iran's nuclear activities and restrict the Islamic Republic's ballistic missile program in return for lifting economic sanctions.

Since then, Washington has reimposed economic sanctions which had previously been lifted under the agreement while Tehran responded by reducing its commitments to pressure other signatories to shield its economy.

The United States recently said that it wants to extend the arms embargo.

<https://www.middleeastmonitor.com/20200507-iran-trump-will-regret-withdrawing-fromnuclear-deal/>

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Korea Times (Los Angeles, Calif.)

S. Korea Already Made Best Offer in Defense Cost Talks with U.S. Despite Calls for Flexibility: Source

By Korea Times

May 6, 2020

South Korea has already made its best possible offer in defense cost-sharing talks with the United States, a diplomatic source said Wednesday, after a senior U.S. official urged Seoul to show flexibility.

On Tuesday, Marc Knapper, deputy assistant secretary of state for Korea and Japan, renewed Washington's call for flexibility, stressing that the U.S. has been "very flexible up until now."

"I cannot mention the number, but the foreign minister has already said that the offer was the best possible one," the source told Yonhap News Agency on condition of anonymity.

The source was referring to Foreign Minister Kang Kyung-wha's parliamentary remarks last week that a 13 percent increase from last year's defense cost-sharing deal, called the Special Measures Agreement (SMA), was the highest offer Seoul can make.

Kang made the remarks in response to a lawmaker's question regarding the media reports that U.S. President Donald Trump had rejected Seoul's offer of at least a 13 percent increase.

After the reports, Trump confirmed the rejection without mentioning any number, saying Seoul should pay "for a big percentage of what we're doing" there.

Despite Washington's claims of its flexibility in the SMA talks, the source said there has been little progress in SMA talks since early April.

"There has been no big change since early April," the source said. "We have no idea whatsoever as to what kind of flexibility that the U.S. is talking about."

Since the last unfruitful talks over the sharing of the cost for stationing the 28,500-strong U.S. Forces Korea (USFK) in Los Angeles in March, Seoul's top negotiator Jeong Eun-bo and his U.S. counterpart, James DeHart, have continued communication by email and phone.

Trump's rejection deepened worries that tensions over the defense cost could erode the alliance at a time when Seoul and Washington need to focus on advancing the stalled negotiations to denuclearize North Korea and foster lasting peace on the Korean Peninsula.

The protracted tug of war also heightened concerns that it could weaken the allies' combined defense posture when Pyongyang appears intent on bolstering its missile and rocket capabilities through repeated firing tests.

Such security concerns escalated further when thousands of South Korean USFK employees in nonessential positions were forced to go on unpaid leave last month, apparently hampering the USFK's day-to-day operations.

Some observers raised cautious optimism that a turnaround in SMA negotiations could come, given that President Moon Jae-in seeks U.S. support for his inter-Korean cooperation projects, while Trump wants Seoul's cooperation in securing quarantine supplies to battle the COVID-19 pandemic.

Others, however, said that whether Trump would agree to a compromise remains uncertain, as he appears intent to project himself as a good deal-maker, especially ahead of the November elections for a second term.

<http://www.koreatimesus.com/s-korea-already-made-best-offer-in-defense-cost-talks-with-u-s-despite-calls-for-flexibility-source/>

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COMMENTARY

The Hill (Washington, D.C.)

Time to Restart Nuclear Arms Negotiations with Russia

By John Fairlamb

May 3, 2020

The Associated Press reported on April 17 that Secretary of State Mike Pompeo and his Russian counterpart, Foreign Minister Sergey Lavrov, discussed nuclear arms control issues. Minister Lavrov reportedly expressed a desire to extend the New START Treaty, which expires next year. Separately, Deputy Foreign Minister Sergei Ryabkov added that Russia's new Sarmat heavy intercontinental ballistic missile and the Avangard hypersonic glide vehicle could be counted along with other Russian nuclear weapons under the treaty. The U.S. already considers these systems subject to New START limitations.

Minister Lavrov was specific that Washington must agree to extend New START before Russia would agree to include new Russian systems in future negotiations. Secretary Pompeo reiterated the U.S. position that future arms control talks must embrace the White House desire to include China in a trilateral arms control agreement.

Frankly, holding New START hostage to Chinese agreement to join a trilateral negotiation makes no sense. Under New START, Russia and the U.S. are permitted to deploy up to 1,550 nuclear warheads. China maintains a minimum deterrence force that the director of the Defense Intelligence Agency recently stated to be a couple of hundred nuclear warheads. Given this large disparity, China has little to gain from negotiating and has shown little interest in doing so. If Russia and the U.S. can bring their numbers down significantly through a new round of negotiations, there could be a basis then to persuade China to join a trilateral negotiation.

The Trump administration should immediately accept the Russian offer to extend the New START Treaty and to engage in a new round of strategic arms negotiations. New START is the only U.S.-Russian nuclear treaty still in effect. If the pact is permitted to expire in February 2021, there will be no limits on Russian strategic systems and no inspection regime to verify what types and numbers of systems the Russians are deploying. The Joint Chiefs of Staff and the Intelligence Community are solidly in favor of extending New START because they know what the adverse impact will be on our ability to assess the threat to U.S. interests and our planning to address that threat.

A bold approach the U.S. should consider is to enter into a negotiation now with Russia to extend New START at a lower level of 1,000 deployed warheads from the currently authorized 1,550. During the 2010 negotiations on New START, the Joint Chiefs certified that 1,000 would be adequate to support our deterrence strategy. Most of the rest of the New START text could remain the same, and the goal should be to extend the treaty at the lower level quickly and immediately enter into another negotiation to include new systems as the Russians suggest, possibly at even lower levels. The Office of the Secretary of Defense should be tasked to do an analysis to determine how low we could go under 1,000 deployed warheads.

Some caution is warranted concerning the Russian proposal. We should be careful about agreeing to include hypersonic glide vehicles in follow-on negotiations. The U.S. needs a long-range, conventional missile using this technology and it is currently a high-priority Department of Defense

program. We need a conventionally armed, hypersonic missile in the range of 8,000 to 10,000 kilometers that can be launched from U.S.-controlled territory on short notice. Why? If we had hard intelligence today that North Korea is preparing nuclear armed missiles with sufficient range to reach U.S. territory for launch, the only systems we have that can strike that target promptly are nuclear. A conventional long-range, prompt-strike system provides a much-needed option.

Russia and China fear such a system because, if deployed in large numbers, it could provide a conventional first-strike capability against their nuclear systems. Currently, we do not plan to build a nuclear version and we could agree to limit the number of the conventional versions to be deployed. But the definition of hypersonic glide vehicle would have to be crafted carefully so an agreement doesn't capture our planned conventional version. A policy statement also should be included in the agreement text concerning our intent not to consider a conventional version subject to the treaty.

Extending New START and entering into negotiations to reduce the numbers of deployed U.S. and Russian strategic systems are both in the U.S. national interest. The Trump administration should seize this opportunity to do so.

John Fairlamb, Ph.D., is a retired U.S. Army colonel with a military career spanning 45 years, with significant time in Joint Service assignments where he taught nuclear strategy and helped to formulate arms control agreements.

<https://thehill.com/opinion/international/494960-time-to-restart-nuclear-arms-negotiations-with-russia>

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Defense News (Washington, D.C.)

Expand Missile Defenses during the Pandemic, Don't Cut Them

By Rebecca L. Heinrichs

May 5, 2020

Rogue states are taking advantage of the American preoccupation with the COVID-19 pandemic.

North Korea may test another long-range missile according to the head of U.S. Northern Command, Gen. Terrence O'Shaughnessy. He warned Congress in March that the North Korean regime is still a serious threat and is improving its missile program. And last week, Iran's Revolutionary Guard successfully launched a satellite into space. This was the first for the terrorist paramilitary group, though not the first for the regime.

The pandemic is likely to prompt Congress to reassess, cut and redirect spending, but safeguarding the American people from missile attack is an essential service the government cannot afford to scale back.

Deputy Assistant Secretary of Defense Rob Soofer said at a recent Hudson Institute event: "[T]oday we are in an advantageous position vis-a-vis North Korea. Forty-four ground-based interceptors. Gen. O'Shaughnessy has complete confidence that the system will work and we can address the threat. Then the question is: Can we wait until 2028?"

The Trump administration intends to deploy in 2028 the Next Generation Interceptor, or NGI, meant to handle far more complicated missile threats than what the Ground-based Midcourse Defense, or GMD, system was initially designed to do.

Still, as Dr. Soofer explained, threats develop at an unpredictable pace, and so the Pentagon is pushing for initiatives to bolster defense in the meantime. Those initiatives will require serious bipartisan cooperation while concurrently developing the NGI and pursuing other advanced capabilities meant to dramatically increase the ability of the missile defense architecture. It's a tall order, but critical, nonetheless.

First, and to be clear, the Pentagon has not yet embraced this step due to its determination to focus on NGI. But Congress should invest in more than just sustaining the current GMD system; it should improve it by adding 20 GBIs to the already fielded 44. The silos will be prepared for the additional numbers since, in 2017, President Donald Trump called for adding more deployed GBIs considering the heightened North Korea missile threat. The Pentagon began work on preparing for their delivery but never emplaced GBIs into those silos because Pentagon officials canceled the Redesigned Kill Vehicle.

The Pentagon had anticipated the Redesigned Kill Vehicle for the nation's new GBIs. After evaluating the resources and time it would take to restart the production line of the Capability Enhancement II interceptors or to rapidly develop an improved kill vehicle that leverages new technology, the Pentagon should choose the most cost-effective solution.

Recall, the Capability Enhancement II was the kill vehicle that performed well in the last complex flight test, which was the first salvo engagement of a threat-representative intercontinental ballistic missile target by GBIs.

Regardless of the option the Pentagon would choose, the result would be a near-term enhanced capability by either increased capacity at a minimum, or an increased capacity with improved kill vehicles on 20 of the 64 at best. Either would be a much better scenario than keeping the backbone of homeland defenses stagnant while we anticipate the NGI in 2028.

But that is not all the country should do. It should also move forward with steps the Pentagon has embraced. Those steps include improving the discrimination radar capability in the next few years so GMD can better detect and characterize the evolving threat, and deploying other existing systems to bolster GMD. Utilizing current systems with impressive testing records against missiles shorter than ICBM range as part of a layered homeland defense is called the "underlay."

As a key component of the underlay, Congress has directed the Pentagon to test the Aegis SM-3 IIA interceptor against an ICBM target. Unfortunately, because of the pandemic, the Missile Defense Agency's planned flight tests will be delayed, including for the SM-3 IIA. The threats facing the country will not wait for the end of the pandemic, and the Pentagon should reconsider that delay. As soon as the country can test the system, and if it is a success, it would be wise to prepare to deploy Aegis SM-3 IIA as the threat requires.

If there is an ICBM attack against the U.S. homeland, a GBI would have the first shot at the incoming missile while it's in its midcourse phase of flight; and if an enemy missile gets through, and the Aegis SM-3 IIA is positioned correctly, it could have another shot at the missile as it begins its descent.

There has been some concern about whether Russia or China have legitimate claims that bolstering homeland defense in this way is destabilizing. But no evidence supports these claims, and, as Dr. Jim Miller, an Obama-era undersecretary of defense for policy, said at a recent Hudson event: "We cannot and must not give Russia or China a veto over the United States' ability to defend ourselves from North Korea and Iran. That is an absolute no-go for any administration."

Another system that is a natural candidate for the underlay is the Terminal High Altitude Area Defense air defense system. Embracing that concept as well, Dr. Miller said: “It makes sense for certain contexts. And if you’re looking at a shorter-range missile and a relatively small footprint of coverage, THAAD has a real chance to contribute in that. To me, that’s certainly the case for Guam and Hawaii.”

But what about cost? That’s the \$10 billion question — a question that happens to be valued at more than the current president’s budget requires for the Missile Defense Agency. The budget request that Congress is currently considering for the MDA is roughly \$9.2 billion, noticeably less than previous years, even as the role of missile defense is supposed to be expanding in the country’s National Security Strategy.

There is no margin for cutting the budget. Congress should rally around this mission and budget, and it should increase funding to sufficiently make these necessary improvements in the near term without paying for them by sacrificing investments like NGI for the not-so-distant future. It can do that without tipping the scale much more than \$10 billion this year. That is eminently reasonable given the pressure every government department will feel after the sudden spending splurge due to the COVID-19 pandemic.

Rebecca L. Heinrichs is a senior fellow at the Hudson Institute where she specializes in nuclear deterrence and missile defense.

<https://www.defensenews.com/opinion/commentary/2020/05/05/expand-missile-defensesduring-the-pandemic-dont-cut-them/>

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Bulletin of the Atomic Scientists (Chicago, Illinois)

Kim Jong Un Is Still Alive. What about Peace with North Korea?

By Catherine Killough

May 5, 2020

The second anniversary of the 2018 Inter-Korean Summit has just passed. Marking the moment, South Korean President Moon Jae-in lamented, “We have been made keenly aware once again that peace will not come overnight.” Images of the two Korean leaders walking hand-in-hand to cross the demarcation line seem a distant, if not surreal memory in a world now overtaken by a global pandemic and sensational false rumors about Kim Jong Un’s health. Nevertheless, another significant milestone—the 70th anniversary of the Korean War—is fast approaching, and the prospects for peace still tug at the hearts of many.

Calls for the United States and North Korea to “make peace” tend to ring hollow in Washington. Peace is a nice sentiment until it is raised as a viable policy option, at which point it becomes a radical concept, cast as a form of appeasement or a slippery slope toward greater danger. Yet Korea peace activism remains active, not only in South Korea where the movement finds its roots, but also in the United States among a growing constituency of progressive Korean Americans and crossmovement allies. Campaigns like the recently formed Korea Peace Now! stand in a long history of women challenging militarism and war on the Korean Peninsula, and their mission to end the Korean War with a peace agreement is shared by several diasporic Korean groups today. Though their views may seem at odds with American foreign policy consensus, they offer a critical perspective for policymakers seeking a solution to the perennial US–North Korea problem.

A long-deferred peace. It should go without saying, but Korea peace activism exists in large part to draw attention to the fact that Korea is not at peace. That the Korean War never formally ended is not a mere technicality, but the source of an intractable impasse that has allowed antagonism and paranoia to fester since 1950. Although open conflict ceased in 1953 with the signing of an armistice, there has been minimal effort to “facilitate the attainment of a peaceful settlement” by the concerned governments. To make matters more complicated, South Korea was not a signatory to the armistice, and the United States and North Korea have accused one another of violating the agreement multiple times.

In this arrested and confused state of war, the Korean Peninsula is often called a tinderbox. This is no exaggeration; there have been one too many close calls for comfort, and the risks of miscalculation, as well as the stakes for renewed conflict, keep growing. In the “fire and fury” mayhem of 2017, the Congressional Research Service’s estimate of “300,000 dead in the first days of fighting” reverberated through cable news networks, think tank panels, and editorials. Most analysts would agree that seven decades of US policy to contain and constrain the North have failed to bring meaningful security to the region. Worse yet, the cumulative effect of sanctions and political isolation has left both sides with ever-diminishing prospects for reconciliation.

After 70 years, this is all made to seem normal. Perversely, even, maintaining the status quo is likened to keeping the peace. But this so-called peace includes a dividing line that separates hundreds of thousands of families; sweeping and punishing sanctions that exacerbate harm to an already struggling people; the expanding militarization of the Asia Pacific; and a costly arms race that could trigger nuclear war at a moment’s notice. For those who find the status quo unacceptable, peace activism becomes one mode of transformation—to heal, reconnect, and humanize a problem that has become fodder for pundits and wargame enthusiasts.

But skepticism abounds. Most people find it inconceivable to extend an olive branch to Pyongyang. The argument largely follows that making peace with North Korea is tantamount to legitimating its status as a nuclear power and turning a blind eye to human rights violations. This false equivalence has branded many a peace activist an apologist. Even President Moon Jae-in, who oversaw an \$8.6 billion increase in South Korea’s defense spending, is habitually red-baited for his modest efforts to engage North Korean leader Kim Jong Un.

Most peace advocates hew closely to the Sunshine Policy theory of change that was popularized by former South Korean President Kim Dae-jung. They contend that a conciliatory approach is far more conducive to advancing human rights and denuclearization efforts than that of maximum pressure or regime change. Making peace with North Korea is not simply the endpoint, but a process by which resolving present-day crises is informed by a history of unresolved conflict and trauma. In practice, this has meant prioritizing a formal end to the Korean War with a peace agreement. Recalling this history is not intended to distract from today’s most pressing issues, but to fundamentally understand why those issues are so difficult in the first place.

Scholars can debate the different approaches endlessly, but policymakers in Washington too often and abruptly dismiss the pro-peace perspective. This is unfortunate, not least because it denies the voices of thousands of Korean Americans who have a personal stake in seeing US–North Korea relations improve in their lifetimes, but also because it limits the scope of creativity and the terms for engagement that are crucial to reducing tensions and closing gaps in understanding. One need only look to the missed opportunities of the last two years for reference.

In 2018, South Korea proposed that the United States sign a peace declaration—a political, nonbinding statement—to move nuclear negotiations forward. The Trump administration had initially demanded that North Korea submit a full inventory of its nuclear arsenal, but when talks

came to an standstill, South Korea urged the United States to accept an offer in which North Korea would “permanently dismantle” its nuclear facilities at Yongbyon for “corresponding measures, such as the end-of-war declaration.”

Critics were quick to oppose the proposal, fearing that it would prematurely lead to a peace treaty and dissolve the US–South Korean alliance. Others challenged the deal on reciprocity, arguing that a peace declaration would be too high a concession for Yongbyon. Alternatively, experts like Siegfried Hecker, the former director of the Los Alamos National Laboratory who has personally toured some of North Korea’s nuclear facilities, argued that closing Yongbyon would have constituted “a major positive signal that they are serious” about denuclearization as it would have placed a cap on North Korea’s plutonium and tritium stockpile. That would have constrained North Korea’s ability to develop nuclear warheads that could fit on intercontinental ballistic missiles, and thus significantly minimize the threat to the United States.

Looking back now, one might conclude that the Trump administration missed a major opportunity. It is just one example of many in the history of US–North Korea diplomacy that demonstrates how withholding even a symbolic gesture of peace can foreclose real opportunities to advance relations and broker a deal that would tangibly roll back a nuclear program that so vexes policymakers.

Since the collapse of the Hanoi Summit, Koreans around the world have expressed their dismay at the souring of US–North Korea relations. It is not easy to capture that pain, but turning it into action is one way that people have managed to retain hope. Peace activists have helped to keep the best vision for Korea’s future in the realm of possibility. When critically engaged, they show that it is possible to hold the idealism of peace with the complexity of its pursuit. In fact, there is no other way forward.

Catherine Killough is the Advocacy and Leadership Coordinator at Women Cross DMZ.

<https://thebulletin.org/2020/05/kim-jong-un-is-still-alive-what-about-peace-with-north-korea/#>

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War on the Rocks (Washington, D.C.)

The Pandemic and America’s Response to Future Bioweapons

By Andrea Howard

May 1, 2020

In the fall of 2011, Dr. Ron Fouchier developed “one of the most dangerous viruses you can make.” Fouchier, a Dutch virologist at the Erasmus Medical Center in Rotterdam, claimed that his team had “done something really, really stupid” and “mutated the hell out of H5N1.” At nearly the same time, Dr. Yoshihiro Kawaoka at the University of Wisconsin-Madison worked on grafting the H5N1 spike gene onto 2009 H1N1 swine flu, creating another transmissible, virulent strain.

Despite only 600 human cases of the H5N1 (“bird flu”) virus in the previous two decades, the exceptionally high mortality rate — greater than 50 percent — pushed the National Science Advisory Board for Biosecurity to block the publication of both teams’ research. After a heated debate in the scientific community, the World Health Organization deemed it safe to publish the findings. While Kawaoka’s paper appeared in the journal *Nature*, Fouchier’s original study appeared in *Science*. Although both teams generated viruses that were not as lethal as their wild forms, critics worried that the papers would enable rogue scientists to replicate the manipulations and weaponize a more contagious virus.

While some arms control experts like Graham Allison believe that “terrorists are more likely to be able to obtain and use a biological weapon than a nuclear weapon,” others have dismissed bioweapons due to dissemination issues, exemplified in failed biological attacks with botulinum toxin and anthrax by the terrorist group Aum Shinrikyo. Furthermore, studies from the U.S. Office of Technology Assessment indicated that bioweapons could cause tens of thousands of deaths under ideal environmental conditions but would not severely undermine critical infrastructure. In 2012, Dr. Anthony Fauci, the longtime director of the National Institute of Allergy and Infectious Diseases, argued that the benefits in vaccine advancement from Fouchier’s research outweighed the risks of nefarious use.

Today, however, Fauci is at the helm of America’s response to a global pandemic. Although the world has never experienced a mass-casualty bioweapons incident, COVID-19 has caused sustained, strategic-level harm. In the absence of a vaccine, it has killed more than 60,000 Americans and forced over 30 million Americans into unemployment. The isolation of large segments of society has crippled the economy and traditional sources of American power: domestically, cascading, second- and third-order effects plague critical national infrastructure; and internationally, power projection wanes, epitomized by the U.S. Navy’s sidelining of the USS Theodore Roosevelt.

While the SARS-CoV-2 virus that causes COVID-19 is not a bioweapon, technological advances increase the possibility of a future bioweapon wreaking similar strategic havoc. Specifically, advancements in genetic engineering and delivery mechanisms may lead to the more lethal microorganisms and toxins and, consequently, the most dangerous pandemic yet. Therefore, the United States should develop a new strategy to deter and disrupt biological threats to the nation.

Engineering the Next Pandemic

Although a bioweapon-induced pandemic seems unlikely in the short term, preparedness for future attacks begins with understanding the possible threat. According to the Centers for Disease Control, bioweapons are intentionally released microorganisms — bacteria, viruses, fungi — or toxins, coupled with a delivery system, that cause disease or death in people, animals, or plants. In contrast to other chemical, biological, radiological, or nuclear weapons, they have distinctive dangerous characteristics: miniscule quantities — even 10-8 milligrams per person — can be lethal; the symptoms can have a delayed onset; and ensuing waves of infection can manifest beyond the original attack site. The Centers for Disease Control grouped over 30 weaponizable microorganisms and toxins into three threat categories based on lethality, transmissibility, and necessity for special public health interventions. While Categories A and B cover existing high and moderate threats, respectively, Category C focuses on emerging pathogens, like the Nipah virus and hantavirus, that could be engineered for mass dissemination. Historically, though, bioweapons were relatively unsophisticated and inexpensive when compared to chemical and nuclear production chains, which explains their protracted use.

One of the earliest examples of biological warfare occurred over 2,000 years ago, when Assyrians infected enemy wells with rye ergot fungus. In 1763, the British army presented smallpox-infested blankets to Native American during the Siege of Fort Pitt. During World War II, the Japanese army poisoned over 1,000 water wells in Chinese villages to study typhus and cholera outbreaks. In 1984, the Rajneeshee cult contaminated salad bars in Oregon restaurants with *Salmonella typhimurium*, causing 751 cases of enteritis. Most recently, *Bacillus anthracis* spores sent in the U.S. postal system induced 22 cases of anthrax and five deaths in 2001, and three U.S. Senate office buildings shut down in February 2004 after the discovery of ricin in a mailroom.

Despite this history of usage, the challenge of disseminating the biological agent has, thus far, meant that bioweapons attacks have not produced high casualties. Bioweapons can be delivered in

numerous ways: direct absorption or injection into the skin, inhalation of aerosol sprays, or via consumption of food and water. The most vulnerable — and often most lethal — point of entry is the lungs, but particles must fall within a restrictive size range of 1 micrometer to 5 micrometers to penetrate them. Fortunately, most biological agents break down quickly in the environment through exposure to heat, oxidation, and pollution, coupled with the roughly 50 percent loss of the microorganism during aerosol dissemination or 90 percent loss during explosive dissemination.

The revolution in genetic engineering provides a path for overcoming delivery issues and escalating a biological attack into a pandemic. First, tools for analyzing and altering a microorganism's DNA or RNA are available and affordable worldwide. The introduction of clustered regularly interspersed short palindromic repeats (CRISPR) — a technique that acts like scissors or a pencil to alter DNA sequences and gene functions — in 2013 made biodefense more challenging. Even as experienced researchers struggle to control clustered regularly interspersed short palindromic repeats and prevent unintended effects, malevolent actors with newfound access can attempt to manipulate existing agents to increase contagiousness; improve resistance to antibiotics, vaccines, and antivirals; enhance survivability in the environment; and develop means of mass production. Infamously, Australian researchers in 2001 endeavored to induce infertility in mice by inserting the interleukin-4 gene into the mousepox virus. Instead, they inadvertently altered the virus to become more virulent and kill previously vaccinated mice, insinuating that the same could be done with smallpox for humans.

Moving one step further, genetic engineering raises the possibility of creating completely new biological weapons from scratch via methods similar to the test-tube synthesis of poliovirus in 2002. It is, thankfully, hard to use this process to create agents that can kill humans. However, genetic engineering can be used to create “non-lethal” weapons that, when coupled with longerrange delivery devices, could kill crops and animals, and destroy materials — fuel, plastic, rubber, stealth paints, and constructional supplies — that are critical to the economy.

Skeptics might question why a rational adversary would risk creating and employing bioweapons that are unpredictable and relatively hard to deliver to a target. First, some potential terrorists are “irrational” in the sense that death does not deter their service to a higher purpose; or, they may simply show a willingness to carry out orders from a state sponsor or a lack of concern for public opinion. Second, future state aggressors might genetically engineer a vaccine to immunize their populations prior to unleashing a bioweapon so that the attack would only be indiscriminate within targeted nations. Third, the unprecedented harm done by COVID-19 demands a transformation of 9/11-era priorities to recognize that “preparing for domestic threats like pandemics will be far greater concerns for most Americans than threats from foreign adversaries.” Bioweapons combine the worst of these national and international threats.

Ultimately, for a bioweapon attack to turn into a pandemic like the SARS-CoV-2 virus, three initial conditions must be met: first, the microorganism or toxin must not have an effective remedy available; second, it must be easily transmittable; and third, it must be fatal for some victims. Whereas a number of natural-born microbes satisfied these conditions in the past, it is possible for a genetically engineered bioweapon to have the same strategic impact in the future.

Prepare for the Worst

John Barry's *The Great Influenza: The Story of the Deadliest Pandemic in History* provides insight into what the world might look like in the approaching age of biological attacks. It portrays how researchers failed to counter the 1918 flu strain while it spread to one-third of the global population. With a mortality rate of approximately 20 percent, the Spanish flu's viral mutations proved especially fatal for military members with strong immune systems. Young people with

previous exposure to milder flu strains likely suffered from immunological memory, which prompted a dysregulated immune response to the 1918 strain. At the time of the book's publication in 2004, President George W. Bush took notice.

In a November 2005 speech at the National Institutes of Health, with Fauci notably in attendance, Bush warned, "If we wait for a pandemic to appear, it will be too late to prepare. And one day many lives could be needlessly lost because we failed to act today." Similarly, the government should prepare now to respond to a future bioweapon attack — whether from terrorism or interstate warfare. This preparation ought to proceed along three categories of action: deterrence, disruption, and defense.

Deterrence

In the realm of biological warfare, the most effective way to save lives is to persuade an adversary that an attack will not succeed. Specifically, deterrence by denial makes the act of aggression unprofitable by "rendering the target harder to take, harder to keep, or both." To this end, the United States can harden its biowarfare response by increasing interagency cooperation, wargaming the resulting plans, and compiling the materials required for their execution.

The Department of Defense — the largest agency in the U.S. government — is the logical choice to organize a "whole-of-government" approach to countering bioweapons. Last November, the Pentagon released the Joint Countering Weapons of Mass Destruction doctrine, which outlined how the military will synchronize its response with governmental stakeholders like the Director of National Intelligence, the United States Agency for International Development, the Department of Energy, and the Department of Health and Human Services. Partnerships, however, should expand beyond governmental agencies via a military joint task force with leadership from the medical community and information technology professionals. The Department of Homeland Security and Centers for Disease Control should coordinate with medical schools to incorporate more curriculum and periodic exercises on pandemic control and emergency response. Likewise, the Pentagon should develop best practices for establishing communications, sustaining services, and combatting disinformation during a pandemic.

While increased interagency cooperation will encourage more robust pandemic plans, wargaming is key to testing how such plans fare in a biowarfare crisis. Last September, the Naval War College in Newport, Rhode Island, ran a two-day wargame called Urban Outbreak 2019, in which 50 experts combatted a notional pandemic. Even though this scenario had a vaccine available from the start, the findings offer prescient insight into actions surrounding COVID-19 — particularly that experienced leaders may display "significant resistance" when encountering first-time situations or prevent troops from interfacing with infected populations. Military and agency leaders should use wargames with worst-case, extraordinary bioweapons to recognize and overcome inherent biases while simultaneously brainstorming how to lower infection rates, implement quarantines, and communicate best practices to the public.

Wargaming should also help planners identify which materials require stockpiling ahead of the next pandemic. COVID-19, for example, exposed shortages of durable protective masks, hand sanitizer, antiseptic wipes, and surface cleaners. The 300,000 businesses that make up the defense industrial base should prepare for the research, production, and delivery of personal protective equipment whenever shortages arise. They should also expect to be tapped for antibiotic, vaccine, or anti-viral production, depending on the nature of the bioweapon.

Disruption

“A pandemic is a lot like a forest fire,” Bush said in his 2005 speech. “If caught early it might be extinguished with limited damage.” If deterrence fails, American policy should focus on the early detection and disruption of bioweapons. To achieve this goal, the United States can advocate for increased verification measures and high-performing information operations.

Although the Biological Weapons Convention went into force in 1975 and has 112 state parties, the treaty lacks verification procedures and merely prohibits the production, stockpiling, and transfer of biological agents for warfare purposes. Since the treaty permits defensive research, a major challenge is the dual-use nature of production chains, wherein the technology for allowable projects also supports harmful weapons. Given the complex and sensitive nature of vital biological research, the United States has chosen not to support the establishment of a verification agency for routine facility inspections. This choice stands in contrast to the American approach toward the Organization for the Prohibition of Chemical Weapons and the International Atomic Energy Agency, both of which have robust verification mechanisms. Without this accountability, however, the Soviet Union established the Biopreparat after signing the Biological Weapons Convention treaty, employing over 50,000 people to produce tons of anthrax bacilli, smallpox virus, and multidrug-resistant plague bacteria.

To assist with the early warning of bioweapon threats, the United States should improve its understanding of international biological facilities. For instance, International Gene Synthesis Consortium members use automated software and a common protocol to screen their customers, as well as synthetic gene orders with dangerous sequences from the Regulated Pathogen Database. Particular attention should be paid to biosafety level-4 and biosafety level-3 labs around the world, where human error has led to the unintentional escape of pathogens. The U.K. foot and mouth outbreak of 2007 was traced to a faulty waste disposal system at Pirbright Laboratory in Surrey. Additionally, SARS laboratory accidents occurred in China in 2004. Increasing the priority given to intelligence gathering and analysis related to bioweapons would be an important step in the right direction.

Defense

If the United States is unable to deter or disrupt a bioweapons attack, it should be prepared to execute a strong defense against it. First and foremost, the military ought to maintain the health of its servicemembers through a COVID-19-inspired operational plan for screening and quarantine. This plan would facilitate prompt and sustained emergency responses and combat operations, including key missions like strategic nuclear deterrent patrols. Domestically, the military will need to assist in civil support, law enforcement, border patrol, and the defense of critical infrastructure. Internationally, the Defense Department will serve as a logistics powerhouse.

At home, the armed forces have the manpower and experience to aid in a variety of national security sectors. In addition to the deployment of U.S. Navy hospital ships to New York City and Los Angeles during COVID-19, the National Guard has conducted drive-through testing, delivered water to vulnerable populations, and carried out state governors' law enforcement orders for curfews and quarantines. For critical national infrastructure, the military will serve as first responders to newfound issues with electrical generation, water purification, sanitation, and information technology.

Abroad, the military could benefit from military-to-military planning and exercises with what former Supreme Allied Commander Europe Adm. (ret.) James Stavridis calls “the equivalent of a North Atlantic Treaty Organization against pandemics.” In the absence of this organization, the Air Force can coordinate logistics efforts to move overseas medical supplies to the United States and bring Americans home.

The United States should draw lessons learned from past international pandemic responses. The cholera outbreak among half a million Haitians following a 2010 earthquake demonstrated that the American military could work with international military counterparts to regenerate critical infrastructure in other countries. The Ebola outbreak in West Africa in 2014 extended that cooperation to nongovernmental organizations like the Red Cross, Doctors Without Borders, and Project Hope.

Successful military cooperation abroad will fulfill basic international needs and build trust for peaceful scientific cooperation, shifting the focus to future questions like whether the bioweapon is mutating, how environmental factors affect its spread, if infected people develop short- or long-term immunity, and which mitigation efforts are effective. Successful in-situ defense will fill interdisciplinary gaps in deterrence and disruption while a layered “3D” approach will determine how well the world fares during the most dangerous pandemic yet.

Conclusion

The COVID-19 pandemic foreshadows how a future bioweapons attack would unfold without proper preparation. Planning for a bioweapons attack is incredibly difficult — bioweapons can be delivered by states or terrorist groups, originate from existing agents or from scratch, and can be delivered in a number of different ways. While establishing a permanent military joint task force with appropriate funding is an achievable first step, combined efforts in deterrence, disruption, and defense are key in anticipating these variables of an attack and surviving it once unleashed.

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<https://warontherocks.com/2020/05/the-pandemic-and-americas-response-to-futurebioweapons/>

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Defense News (Washington, D.C.)

Balance the Operations Tempo of the Small and Aging Bomber Fleet By

Maj. Gen. James Dawkins Jr.

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The great bard William Shakespeare characterized the world as a stage in which a multitude of actors continually enter and exit. One such actor is the Eighth Air Force’s bomber force, which has steadily deployed for nearly two decades supporting operations like Enduring Freedom, Iraqi Freedom and Freedom’s Sentinel, as well as continuous bomber presence operations within the Indo-Pacific region.

In fact, the 69th Expeditionary Bomb Squadron at Minot Air Force Base, North Dakota, flying 50-plus-year-old B-52s, just completed a nine-month continuous bomber presence rotation to Andersen Air Force Base in Guam — the longest bomber deployment of the 21st century.

April marked an important turning point for the “Mighty Eighth,” as all operational squadrons could be found at their home stations. The respite, however, was short-lived, as U.S. strategic bombers continue bomber task force missions in support of the National Defense Strategy-directed Dynamic Force Employment initiative.

The bomber task force approach, also known as BTF, offers a tailored support package of personnel and aircraft to enable combatant commanders’ objectives. The scalable nature of a BTF increases the number of possible operating locations due to its smaller and more agile footprint, which equates to greater flexibility for the distribution of bombers across all geographic combatant commands. The inherent flexibility of a BTF complicates potential adversaries’ decision calculus by projecting combat power from a variety of locations.

The distinctive attributes of BTFs are readiness enhancing: They return home more ready to fight than when they departed home station. The episodic nature of a BTF allows bomber forces to increasingly gain experience from operating with allies and mission partners more so than traditional long-duration deployments because of its proactive and scalable nature. Diverse locations offer varied operational experiences to aircrews by flying out of different airfields, executing long-duration sorties, and training with our allies. Operating from various locations also strengthens logistical chains on a global scale while offering opportunities for innovative maintenance tempos.

BTFs are also shorter when compared to typical deployments, yielding more training opportunities on various mission sets. In short, a bomber force can deploy, train with allies and partners, and then return stateside for focused exercises and training range opportunities.

April also marked the halfway point of the B-1B reset and saw the team return to the world stage as only the B-1B can. The reset, enacted by Air Force Global Strike Command after 17 years of highoperations tempo to restore combat capability, allowed for a host of readiness improvements, which enabled the team to execute several 30-hour round-trip flights to the Indo-Pacific region from their home base.

The initial gains from the reset also allowed the command to deploy a B-1B BTF to Andersen AFB in Guam. The B-1B reset was a community effort to restore the maintenance practices and sortie predictability for the airframe while right-sizing the B-1B mission and crew force to meet combatant commanders’ priorities.

The Mighty Eighth is taking a measured approach in returning the B-1B to operational status to prevent losing the hard-fought increases in aircraft reliability and availability. The method to unimpeded, global B-1B operations will follow a crawl-walk-run approach as the aircraft works with allies and partners, and eventually deploys to nonstandard operating locations.

The B-1’s limited return has reduced the operational tempo on the B-2 and B-52 communities, which were bearing the load of combatant commander taskings. Careful balancing of the operations tempo in the small and aging bomber fleet is critical as the U.S. Air Force acquires the B-21 Raider and transitions to a B-52 and B-21 fleet. Long-range standoff platforms are fundamental to America’s lead in the air throughout the 21st century, and they are foundational to our ability to project power and defend the nation.

The bomber force was home, but only for a short time. The world’s greatest bombers have again departed to deter and, if needed, compel adversaries. In line with Shakespeare, the stage remains the globe, and now the B-1B rejoins its fellow bomber fleets with dynamic and agile entrances and exits in multiple arenas.

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<https://www.defensenews.com/opinion/commentary/2020/05/07/balance-the-operationstempo-of-the-small-and-aging-bomber-fleet/>

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ABOUT THE USAF CSDS

The USAF Counterproliferation Center (CPC) was established in 1998 at the direction of the Chief of Staff of the Air Force. Located at Maxwell AFB, this Center capitalizes on the resident expertise of Air University — while extending its reach far beyond — and influences a wide audience of leaders and policy makers. A memorandum of agreement between the Air Staff's Director for Nuclear and Counterproliferation (then AF/XON) and Air War College commandant established the initial personnel and responsibilities of the Center. This included integrating counterproliferation awareness into the curriculum and ongoing research at the Air University; establishing an information repository to promote research on counterproliferation and nonproliferation issues; and directing research on the various topics associated with counterproliferation and nonproliferation.

In 2008, the Secretary of Defense's Task Force on Nuclear Weapons Management recommended "Air Force personnel connected to the nuclear mission be required to take a professional military education (PME) course on national, defense, and Air Force concepts for deterrence and defense." This led to the addition of three teaching positions to the CPC in 2011 to enhance nuclear PME efforts. At the same time, the Air Force Nuclear Weapons Center, in coordination with the AF/A10 and Air Force Global Strike Command, established a series of courses at Kirtland AFB to provide professional continuing education (PCE) through the careers of those Air Force personnel working in or supporting the nuclear enterprise. This mission was transferred to the CPC in 2012, broadening its mandate to providing education and research on not just countering WMD but also nuclear operations issues. In April 2016, the nuclear PCE courses were transferred from the Air War College to the U.S. Air Force Institute for Technology.

In February 2014, the Center's name was changed to the Center for Unconventional Weapons Studies (CUWS) to reflect its broad coverage of unconventional weapons issues, both offensive and defensive, across the six joint operating concepts (deterrence operations, cooperative security, major combat operations, irregular warfare, stability operations, and homeland security). The term "unconventional weapons," currently defined as nuclear, biological, and chemical weapons, also includes the improvised use of chemical, biological, and radiological hazards. In May 2018, the name changed again to the Center for Strategic Deterrence Studies (CSDS) in recognition of senior Air Force interest in focusing on this vital national security topic.

The Center's military insignia displays the symbols of nuclear, biological, and chemical hazards. The arrows above the hazards represent the four aspects of counterproliferation — counterforce, active defense, passive defense, and consequence management. The Latin inscription "Armis Bella Venenis Geri" stands for "weapons of war involving poisons."

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