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Feature Report

“Assessing the Influence of Hypersonic Weapons on Deterrence”. Edited by Dr. Paige P. Cone. Published by Center for Strategic Deterrence Studies; June 2019

<https://media.defense.gov/2019/Sep/25/2002187108/-1/-1/0/59HYPERSONICWEAPONS.PDF>

During the Academic Year 2019, the U.S. Air Force Center for Strategic Deterrence Studies (CSDS) provided a Deterrence Research Task Force (DRTF) elective for the Air War College and Air Command and Staff College. Seventeen students (11 from the Air War College, six from the Air Command and Staff College) with broad and diverse backgrounds participated in this course, engaging in critical thinking about the nature of strategic deterrence and the role of nuclear weapons under strategic deterrence policy. The class took two field trips. One visited Washington, D.C. to engage with staff in the Office of the Secretary of Defense, Joint Staff, Air Staff, Office of Science and Technology Policy, Defense Intelligence Agency, National Defense University, and the National Nuclear Security Administration. The other field trip was to Lawrence Livermore National Laboratory in Livermore, Calif. to discuss the technical aspects of nuclear weapons.

Dr. James E. Platte, Dr. Paige Cone, and Dr. Lew Steinhoff were the instructors of this elective and faculty advisors for student research. The research questions for this year’s DRTF came from U.S. Air Force Global Strike Command and the Deputy Chief of Staff for Nuclear Integration and Strategic Stability (AF/A10) and were divided into two broad themes. First, how can the United States effectively posture in East Asia for a strategic competition with China? Second, how can the United States prepare for a conflict that potentially escalates to an adversary using a low-yield nuclear weapon?

From those two research themes, a selection of the best student research papers was placed into three volumes for publication. Volume I is *Extended Deterrence and Strategic Stability in East Asia*. Volume II is *Non-U.S. Deterrence Strategies: What Must the United States Be Prepared For?* This monograph, *Assessing the Influence of Hypersonic Weapons on Deterrence*, represents the final student research papers.

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Moreover, since the nuclearization of the subcontinent in the late 1980s, Pakistan has repeatedly threatened the deployment of nuclear weapons in crises with India as part of its “catalytic” nuclear posture, designed both to deter a major conventional attack by India and to draw the United States and other great powers into any military crisis on the subcontinent.

NUCLEAR WEAPONS

Air Force Magazine (Arlington, Va.)

Malmstrom, Vandenberg Launch Unarmed ICBM in Test

By Brian Everstine

Oct. 2, 2019

Air Force Global Strike Command early Oct. 2 launched an unarmed Minuteman III intercontinental ballistic missile from Vandenberg AFB, Calif., in a test the command says was planned long in advance.

The test launch, handled by a crew from the 341st Missile Wing at Malmstrom AFB, Mont., took place at 1:13 a.m. local time. The missile traveled about 4,200 miles to the Kwajalein Atoll in the Marshall Islands, according to an AFGSC release.

The missile was equipped with a test re-entry vehicle, to verify the accuracy and reliability of the system “providing valuable data to ensure a safe, secure, and effective deterrent,” AFGSC said.

The Air Force sets its launch calendars three to five years in advance, and officials spend six months to a year planning ahead for specific launches.

“The Minuteman III is nearly 50 years old, and continued test launches are essential in ensuring its reliability until the mid-2030s when the Ground-[Based] Strategic Deterrent is fully in place,” Col. Omar Colbert, commander of the 576th Flight Test Squadron, said in the release. “Most importantly, this visible message of national security serves to assure our partners and dissuade potential aggressors.”

Vandenberg regularly hosts test launches of Minuteman missiles, recently firing two within one month earlier this year.

While the Air Force said the launch was planned long in advance, it took place shortly after North Korea fired a sea-based ballistic missile off of its east coast. The South Korean military said the projectile flew 280 miles, reaching an altitude of 565 miles, according to Reuters. North Korea is known to be developing submarine-launched ballistic missiles.

<http://www.airforcemag.com/Features/Pages/2019/October%202019/Malmstrom-Vandenberg-Launch-Unarmed-ICBM-in-Test.aspx>

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Aiken Standard (Aiken, S.C.)

Sandia Lab, Fluor, Others Involved with Early Pit Work, SRNS Mission Director Says

By Colin Demarest

Sept. 25, 2019

Preparing for and crafting preliminary designs for the Savannah River Plutonium Processing Facility, the proposed plutonium pit hub at the Savannah River Site, is a national affair with distinct local ties.

The sizable effort stretches from east to west, and in South Carolina touches Greenville and the Aiken area, more specifically, according to Dave Olson, the pit production mission director for Savannah River Nuclear Solutions, the head contractor at the site.

"It's being done by four agencies," Olson said Tuesday afternoon, speaking to the Aiken Standard after a lunchtime presentation to the Augusta Metro Chamber of Commerce.

Security work – things to keep the facility protected, as he described it – is entrusted to Sandia National Laboratory in New Mexico, an installation recognized for its defense portfolio.

"They do that for all the NNSA projects," Olson said, using shorthand for the National Nuclear Security Administration, the U.S. Department of Energy's weapons-and-nonproliferation arm.

So-called "process equipment," used to make the pits, or nuclear weapon cores, is being handled by Merrick, a company out of Colorado, Olson explained. Merrick just recently opened an office in Aiken.

Fluor in Greenville has been delegated work related to systems that aren't "safety in nature," Olson said. "So ventilation, power, water, that kind of thing."

Savannah River Nuclear Solutions – the management and operations contractor at the Savannah River Site, and the team the NNSA tapped to spearhead preliminary pit assignments – is doing some of the safety-tied designs, like fire systems, and is also considered the integrator of it all.

In total, Olson described it as a "team effort."

Conceptual design work, done with the help of plutonium experts, an NNSA senior spokesperson has previously told the Aiken Standard, will inform future mission decisions and funding.

The early designs could be approved in September 2020, Olson said. That's in line with predictions made by other nuclear executives.

"So this time next year," Olson noted.

SRNS parent company Fluor selling its government, equipment businesses

At least 80 plutonium pits, commonly referred to as nuclear weapon triggers, are needed by 2030, according to the 2018 Nuclear Posture Review, a leading Pentagon nuclear policy document. The pits will be used to bolster the nation's nuclear stockpile, officials have said.

"In some cases there's weapons that are 40 years old," U.S. Secretary of Energy Rick Perry said in a Fox News interview earlier this year. "As any type of product, it's going to have some degradation."

"The country needs a nuclear deterrent," Olson said Tuesday, speaking from a personal perspective. "There are still countries that aren't our friends."

In order to satisfy the military demand, the NNSA and the U.S. Department of Defense last year recommended making 50 pits per year at the Savannah River Site and the remaining 30 pits per year at Los Alamos National Laboratory in New Mexico, the nation's plutonium center of excellence.

As proposed, the pit mission at the Savannah River Site requires renovating and reusing the Mixed Oxide Fuel Fabrication Facility, a never-completed, multibillion-dollar project that was terminated Oct. 10, 2018.

Millions of dollars were expected to be used for conceptual plutonium pit production design at the Savannah River Site, the NNSA senior spokesperson said in February. A separate multimillion-dollar pool was provided to Savannah River Nuclear Solutions for MOX termination and transition activities, as was reported earlier by the Aiken Standard.

The lead contractor filed its MOX turnover plan around Christmas.

"We're looking at footprint, layout, design, what have you. We've got a phenomenal group of people working on this effort right now," NNSA chief Lisa Gordon-Hagerty said in a June interview.

"...We've got stand-up teams, we're doing things. I see engagement across our entire enterprise."

Failing to meet the 2030 pit production deadline would ripple into higher costs and a greater demand for the pits, according to the 2018 Nuclear Posture Review.

https://www.aikenstandard.com/news/sandia-lab-fluor-others-involved-with-early-pit-work-srns/article_0f741ebc-df95-11e9-96bc-8bda5d64fc08.html

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Defense News (Washington, D.C.)

China Unveils Drones, Missiles and Hypersonic Glide Vehicle at Military Parade

By Mike Yeo

Oct. 1, 2019

MELBOURNE, Australia — China has showcased new types of missiles and unmanned platforms for the first time at a military parade in its capital on Oct. 1 to mark the 70th anniversary of its founding.

The unmanned technologies included a large unmanned underwater vehicle, along with a high-speed unmanned aircraft believed to be capable of supersonic flight.

However, it was the missiles that took center stage — unsurprisingly given that the People's Liberation Army Rocket Force, or PLARF, will be a central player in any future conflict involving China.

As previously reported by Defense News, the road-mobile DF-41 intercontinental ballistic missile and the JL-2 submarine-launched ballistic missile each made their debut at the parade in Beijing's Tiananmen Square, representing the survivability of China's nuclear deterrence.

China's state-run news agency Xinhua said the 16 DF-41 transporter-erector-launchers at the parade came from two PLARF brigades, while the 12 JL-2 truck-mounted canisters at the parade represented the striking power of each of China's projected force of six Jin-class ballistic missile submarines.

The biggest surprise at the parade was the appearance of the DF-17 hypersonic glide vehicle, or HGV. The DF-17 consists of a standard ballistic missile booster for its first stage. The second stage is a low-flying projectile used to attack a target following the first stage's ballistic reentry.

Reports citing U.S. government sources have said China has carried out several tests of HGVs, including the DF-17, since 2014. The DF-17 is the first system of its type known to be operational in the world, although several other nations including the U.S. are developing similar systems.

Also making their respective debuts at the parade were a pair of Chinese unmanned aircraft systems. The first of these was the Sharp Sword low-observable combat UAV. The example displayed at the parade featured a new stealthy engine intake and engine nozzles, in contrast to earlier photos showing a more conventional and less stealthy equivalents.

The other drone making its debut is believed to be a high-speed platform. Believed to be capable of attaining supersonic flight, the type, which has been referred to as the WZ-8, reportedly made its first flight in 2015 and is suspected in some quarters to be capable of launching from another aircraft such as the Xi'an H-6N bomber.

Photos from the parade confirm that this UAS is powered by a pair of rockets instead of an air-breathing engine, and suggests that speed is the priority for the design, possibly for reconnaissance missions or for attacking a high-value target.

The parade also saw the debut of the HSU001 large unmanned underwater vehicle, with two systems mounted on trailers. Each vehicle is powered by two propellers and appear to be able to mount a variety of payloads including mast-mounted optics, although little else is known.

<https://www.defensenews.com/global/asia-pacific/2019/10/01/china-unveils-drones-missiles-and-hypersonic-glide-vehicle-at-military-parade/>

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US COUNTER-WMD

Homeland Preparedness News (Washington, D.C.)

ASPR's Kadlec: Smallpox One of Many Biothreats U.S. Must Anticipate

By Kim Riley

Sept. 24, 2019

The Sept. 14 gas explosion that stoked a fire at a Russian bioweapons facility in Siberia where viruses and bacteria including smallpox, Ebola and anthrax are stored reminded the world that humans are only one catastrophic biological event away from a pandemic that could kill tens of millions of people.

While no biological material was stored in the sanitary inspection room where the explosion occurred at the Russian State Centre for Research on Virology and Biotechnology, a.k.a. the Vector, the gas cylinder blast could have created a situation in which potentially deadly viruses or bacteria were unleashed to spread like wildfire.

The reason the Vector incident is so noteworthy is because it's one of just two labs in the world that are approved to have the smallpox virus for research. The other approved lab is the Centers for Disease Control and Prevention (CDC) in the United States.

Smallpox scares public health authorities because, as the CDC says, it is a serious — even deadly — disease.

“Smallpox is one of the deadliest diseases known to mankind; the virus infected roughly 50 million people a year and killed an estimated 300 million people worldwide in the 20th century alone” before the World Health Organization deemed it eradicated in 1980, said Dr. Robert Kadlec, Assistant Secretary for Preparedness and Response (ASPR) at the U.S. Department of Health and Human Services (HHS), in an interview with Homeland Preparedness News.

The CDC says there’s a credible concern that the virus could be used in bioterrorism, and Kadlec said the potential use of smallpox as a bioweapon means “the virus remains a potential threat to national and global health security.”

North Korea, in fact, has threatened such use of smallpox.

North Korean leader Kim Jong-un’s alleged doomsday arsenal — which many experts agree would be used by Pyongyang’s military in a war — includes a stockpile of smallpox, along with other biological agents.

“Having vaccines and treatments at-the-ready will be imperative to saving lives,” said Kadlec, adding that the United States is preparing to counter such a bioattack.

“We have a long-standing international commitment to develop vaccines and treatments for smallpox infections,” Kadlec explained, adding that over the past 12 years, the Biomedical Advanced Research and Development Authority (BARDA) at ASPR has worked with private industry to develop such products as part of ongoing preparedness efforts against biodefense threats.

“The U.S. has vaccines, treatments and other materials stockpiled for a nationwide smallpox response,” added Kadlec.

Earlier this month, for example, ASPR awarded approximately \$170 million to Emergent BioSolutions of Gaithersburg, Md., to purchase its smallpox vaccine, called ACAM2000, which is the only vaccine licensed by the U.S. Food and Drug Administration for active immunization against smallpox disease for persons determined to be at high risk for smallpox infection.

Emergent’s vaccine will be used to build and replenish vaccines stored in the Strategic National Stockpile (SNS) over the next decade. ASPR, which oversees the SNS, may purchase additional vaccines over the next 10 years, with a target of \$2 billion in procurement and surge options for up to a total of nearly \$2.8 billion, according to HHS.

“The U.S. government’s long-term commitment to smallpox preparedness and the role ACAM2000 vaccine serves have been reinforced in guidance and legislation within the last two decades,” said Abbey Jenkins, senior vice president and vaccines business unit head at Emergent. “As the only smallpox vaccine administered in one dose, ACAM2000 vaccine remains the primary smallpox vaccine for general population use in the event of a smallpox emergency.”

Kadlec noted that “regardless of the size or the source” of such public health security threats, “smallpox is just one of the many threats our nation must be prepared for.”

So in addition to supporting the development and stockpiling of smallpox vaccine products, Kadlec said the U.S. is building on a concept that started as a tiered system of hospitals across the country to treat Ebola patients.

“We want those hospitals to be ready to handle all highly infectious diseases, including smallpox,” he told Homeland Preparedness News.

When asked about which other countries might pose similar biothreats to the U.S., Kadlec answered honestly.

“We do not know, for certain, that all virus samples were destroyed and only remain in the two high-security laboratories in the U.S. and Russia,” he said. “The global concern has been and continues to be that the [smallpox] virus could be released accidentally or intentionally.”

Tremendous and continuing advances in synthetic biology, also are making technologies easier and more accessible, said Kadlec.

“The world could see the virus created in laboratories by people who intend harm,” he said. “That ongoing concern is why we have continued to work on vaccines and treatments for the disease.”

Kadlec and other experts have been saying for years now that a pandemic is inevitable and close at hand.

Most recently, a new independent report warns that there is a “very real threat” of a pandemic that could cause the deaths of up to 80 million people and strangle almost 5 percent of the global economy.

“A global pandemic on that scale would be catastrophic, creating widespread havoc, instability and insecurity. The world is not prepared,” say report authors in *A World at Risk: Annual report on global preparedness for health emergencies*.

Compiled and published by the Global Preparedness Monitoring Board (GPMB), which was assembled last year in response to a request from the office of the United Nations secretary-general, and convened jointly by the World Health Organization (WHO) and the World Bank, the GPMB report provides a searing attack on the lack of political, financial and logistical will around pandemic preparedness efforts.

At the same time, the report also offers seven “urgent actions” for preparing against global health emergencies, including that heads of government “must commit and invest.”

Kadlec offered similar solutions.

“The threats our nation faces — natural or man-made — are serious and continue to evolve,” he said. “Constant vigilance — constant preparedness — for evolving threats requires substantial and sustained funding and interagency cooperation. We must do everything we can to be ready to save lives in any type of emergency, whether it’s the next pandemic or a bio-incident.”

<https://homelandprepnews.com/stories/37031-asprs-kadlec-smallpox-one-of-many-biothreats-u-s-must-anticipate/>

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National Defense (Arlington, Va.)

Dragonflies Studied for Hypersonic Maneuverability

By Connie Lee

Sept. 26, 2019

Dragonflies — a common sight in spring and summer — may be key to developing more precise and maneuverable missiles.

The creatures are able to catch 95 percent of their prey, designating them as one of the world's top predators. Now, Sandia National Laboratories is researching how it can apply a dragonfly's technique to missiles, said Frances Chance, a computational neuroscientist at Sandia.

The insects take about 50 milliseconds to react to prey despite their limited vision, Chance noted. The project is part of Sandia's autonomy for hypersonic research campaign.

"They're very good hunters ... but they have limited vision," she said.

Chance is building a computational model to examine what a dragonfly does when it is intercepting its prey and how its nervous system reacts. The model, which is slated to be completed in October, could later become more complex, she noted. Algorithms gathered from the research could be integrated onto high-speed weapons, such as hypersonic vehicles, which are characterized by their ability to move at speeds of Mach 5 or faster.

"It is admittedly high risk/high gain, but it's been a small investment just to see if it's feasible to look to nervous systems for algorithms for this type of domain area," she said.

"These aren't intended to go on, let's say, a missile tomorrow. ... It would be the next generation of missiles or even the next generation after that."

The information could help determine what kind of sensors or calculations to use for faster missile interceptions, Chance noted.

"If we understand what the dragonfly is doing with its neurons and we translate that algorithm to ... whatever the fastest computer we can put on a defensive weapon is, how much faster can we make that calculation for the interception trajectory?" she asked.

However, it is still too early in the process to know how this research will translate into military capability, she noted.

"A success for me would be if it changes the way ... [engineers] think about designing the next generation of weapons, potentially even getting implemented on the next generation of weapons," she said.

<https://www.nationaldefensemagazine.org/articles/2019/9/26/dragonflies-studied-for-hypersonic-maneuverability>

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US ARMS CONTROL

MIT News (Cambridge, Mass.)

How to Dismantle a Nuclear Bomb

By Peter Dizikes

Sept. 30, 2019

How do weapons inspectors verify that a nuclear bomb has been dismantled? An unsettling answer is: They don't, for the most part. When countries sign arms reduction pacts, they do not typically grant inspectors complete access to their nuclear technologies, for fear of giving away military secrets.

Instead, past U.S.-Russia arms reduction treaties have called for the destruction of the delivery systems for nuclear warheads, such as missiles and planes, but not the warheads themselves. To comply with the START treaty, for example, the U.S. cut the wings off B-52 bombers and left them in the Arizona desert, where Russia could visually confirm the airplanes' dismemberment.

It's a logical approach but not a perfect one. Stored nuclear warheads might not be deliverable in a war, but they could still be stolen, sold, or accidentally detonated, with disastrous consequences for human society.

"There's a real need to preempt these kinds of dangerous scenarios and go after these stockpiles," says Areg Danagoulian, an MIT nuclear scientist. "And that really means a verified dismantlement of the weapons themselves."

Now MIT researchers led by Danagoulian have successfully tested a new high-tech method that could help inspectors verify the destruction of nuclear weapons. The method uses neutron beams to establish certain facts about the warheads in question — and, crucially, uses an isotopic filter that physically encrypts the information in the measured data.

A paper detailing the experiments, "A physically cryptographic warhead verification system using neutron induced nuclear resonances," is being published today in *Nature Communications*. The authors are Danagoulian, who is an assistant professor of nuclear science and engineering at MIT, and graduate student Ezra Engel. Danagoulian is the corresponding author.

High-stakes testing

The experiment builds on previous theoretical work, by Danagoulian and other members of his research group, who last year published two papers detailing computer simulations of the system. The testing took place at the Gaerttner Linear Accelerator (LINAC) Facility on the campus of Rensselaer Polytechnic Institute, using a 15-meter long section of the facility's neutron-beam line.

Nuclear warheads have a couple of characteristics that are central to the experiment. They tend to use particular isotopes of plutonium — varieties of the element that have different numbers of neutrons. And nuclear warheads have a distinctive spatial arrangement of materials.

The experiments consisted of sending a horizontal neutron beam first through a proxy of the warhead, then through an encrypting filter scrambling the information. The beam's signal was then sent to a lithium glass detector, where a signature of the data, representing some of its key properties, was recorded. The MIT tests were performed using molybdenum and tungsten, two metals that share significant properties with plutonium and served as viable proxies for it.

The test works, first of all, because the neutron beam can identify the isotope in question.

“At the low energy range, the neutrons’ interactions are extremely isotope-specific,” Danagouliau says. “So you do a measurement where you have an isotopic tag, a signal which itself embeds information about the isotopes and the geometry. But you do an additional step which physically encrypts it.”

That physical encryption of the neutron beam information alters some of the exact details, but still allows scientists to record a distinct signature of the object and then use it to perform object-to-object comparisons. This alteration means a country can submit to the test without divulging all the details about how its weapons are engineered.

“This encrypting filter basically covers up the intrinsic properties of the actual classified object itself,” Danagouliau explains.

It would also be possible just to send the neutron beam through the warhead, record that information, and then encrypt it on a computer system. But the process of physical encryption is more secure, Danagouliau notes: “You could, in principle, do it with computers, but computers are unreliable. They can be hacked, while the laws of physics are immutable.”

The MIT tests also included checks to make sure that inspectors could not reverse-engineer the process and thus deduce the weapons information countries want to keep secret.

To conduct a weapons inspection, then, a host country would present a warhead to weapons inspectors, who could run the neutron-beam test on the materials. If it passes muster, they could run the test on every other warhead intended for destruction as well, and make sure that the data signatures from those additional bombs match the signature of the original warhead.

For this reason, a country could not, say, present one real nuclear warhead to be dismantled, but bamboozle inspectors with a series of identical-looking fake weapons. And while many additional protocols would have to be arranged to make the whole process function reliably, the new method plausibly balances both disclosure and secrecy for the parties involved.

The human element

Danagouliau believes putting the new method through the testing stage has been a significant step forward for his research team.

“Simulations capture the physics, but they don’t capture system instabilities,” Danagouliau says. “Experiments capture the whole world.”

In the future, he would like to build a smaller-scale version of the testing apparatus, one that would be just 5 meters long and could be mobile, for use at all weapons sites.

“The purpose of our work is to create these concepts, validate them, prove that they work through simulations and experiments, and then have the National Laboratories to use them in their set of verification techniques,” Danagouliau says, referring to U.S. Department of Energy scientists.

Karl van Bibber, a professor in the Department of Nuclear Engineering at the University of California at Berkeley, who has read the group’s papers, says “the work is promising and has taken a large step forward,” but adds that “there is yet a ways to go” for the project. More specifically, van Bibber notes, in the recent tests it was easier to detect fake weapons based on the isotopic characteristics of the materials rather than their spatial arrangements. He believes testing at the relevant U.S. National Laboratories — Los Alamos or Livermore — would help further assess the verification techniques on sophisticated missile designs.

Overall, van Bibber adds, speaking of the researchers, “their persistence is paying off, and the treaty verification community has got to be paying attention.”

Danagoulian also emphasizes the seriousness of nuclear weapons disarmament. A small cluster of several modern nuclear warheads, he notes, equals the destructive force of every armament fired in World War II, including the atomic bombs dropped on Hiroshima and Nagasaki. The U.S. and Russia possess about 13,000 nuclear weapons between them.

"The concept of nuclear war is so big that it doesn't [normally] fit in the human brain," Danagoulian says. "It's so terrifying, so horrible, that people shut it down."

In Danagoulian's case, he also emphasizes that, in his case, becoming a parent greatly increased his sense that action is needed on this issue, and helped spur the current research project.

"It put an urgency in my head," Danagoulian says. "Can I use my knowledge and my skill and my training in physics to do something for society and for my children? This is the human aspect of the work."

The research was supported, in part, by a U.S. Department of Energy National Nuclear Security Administration Award.

<http://news.mit.edu/2019/verify-dismantle-nuclear-bombs-0927>

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VOA (Washington, D.C.)

Bolton: 'Military Force Has to Be an Option' on Denuclearizing North Korea

By Christy Lee

Sept. 30, 2019

WASHINGTON - Former National Security Adviser John Bolton said military force has to remain an option in dealing with North Korea's nuclear weapons and missile programs because it will not follow through with its commitment to denuclearize and negotiate away its programs.

In his first public speech since his departure from the White House, Bolton told an audience Monday at the Center for Strategic and International Studies (CSIS), a Washington-based think tank, that North Korean leader Kim Jong Un will not "honor" his denuclearization commitment and give up the country's nuclear weapons and missile programs through diplomacy.

Bolton's position appeared to contradict approaches that President Donald Trump has been taking toward North Korea. Before his first summit with Kim in June 2018, Trump said North Korea had "agreed to denuclearize."

Bolton said the questions to focus on now are not, "Can we get another summit with Kim Jong Un, or what the state of staff-level negotiations are to achieve a commitment from North Korea" that Bolton thinks North Korea "will never honor."

He said the reason that North Korea will not follow through his denuclearization commitment is because the country "has not made strategic decision to give up its nuclear weapons."

"In fact, I think the contrary is true," he said. "I think the strategic decision that Kim Jong Un is operating through is that he will do whatever he can to keep a deliverable nuclear weapons capability and to develop and enhance it further."

Kim has made commitments to denuclearize through his New Year's Day speech given this year and through messages conveyed to Seoul and Beijing last year.

Bolton said Kim may offer to carry out partial denuclearization while he seeks for sanctions relief, but "under current circumstances, he will never give up the nuclear weapons voluntarily."

At the Hanoi Summit in February, Kim asked Trump to lift sanctions in exchange for dismantling a part of its nuclear weapons facilities, which Trump rejected, asking for full denuclearization instead before any sanctions relief.

In order to thwart growing dangers from North Korea's nuclear weapons program, Bolton said, "At some point, military force has to be an option."

Otherwise, Bolton sees North Korea becoming "the new A.Q. Khan, the Walmart or the Amazon of deliverable nuclear weapons," proliferating nuclear weapons and spreading threats around the world.

A.Q. Khan — Abdul Qadeer Khan, known as the father of Pakistan's nuclear program — confessed in 2004 he sold nuclear secrets to North Korea, Iran and Libya, proliferating nuclear weapons technology to those countries.

Bolton left his post as President Donald Trump's third national security adviser earlier in September, apparently due to clashes he had with Trump on how to handle foreign policy challenges, including North Korea's nuclear weapons program.

In April 2018, Bolton, a foreign policy hawk, called for applying a Libyan model to North Korea, which was criticized by Pyongyang. In the early 2000s, Libyan leader Moammar Gadhafi agreed to give up his nuclear weapons program in exchange for lifting sanctions. Shortly after renouncing his nuclear program, Gadhafi was overthrown and killed by rebels.

After Bolton's departure, Trump said Bolton made a mistake offending North Korea by demanding that it follows a Libyan model.

Trump has shown leniency toward North Korea's short-range missile tests conducted since May. Trump called the tests "very standard," and said that Kim kept his promise not to test intercontinental ballistic missiles (ICBM).

But Bolton said the recent North Korean tests violated the United Nations Security Council resolutions he helped to draft in 2006, which ban the country from launching a ballistic missile.

Unlike Trump, who has been downplaying North Korea's short-range missile launches this summer, Bolton underscored the dangers of those tests.

"The testing of shorter-range ballistic missiles that we've seen in recent months doesn't give us any reason to think that those are not threatening because the capabilities, the technology, things like maneuverability of close-range or short-range ballistic missiles, by definition can be adopted to the longer-range ballistic missiles," said Bolton. "So that indeed, the testing that's going on now is not unthreatening."

The reason North Korea has not launched ICBMs or nuclear weapons is because he believes the country has completed developing technologies to produce them and finds no need to test those technologies.

"One reason, one very good, very troubling reason why there's no more testing of nuclear weapons for the moment or of long-range missiles is that North Korea has in its judgment, for well or ill, finished testing and can produce nuclear warheads and long-range ballistic missiles," Bolton said. "That's not an encouraging sign. That's a sign to be worried about."

Also, unlike Trump, who said he is "not in a rush" to denuclearize North Korea, Bolton suggested the U.S. needs to take immediate actions to remove North Korea's nuclear weapons program, as the danger continues to grow.

"When the danger is perceptible, the costs of acting are low, the failure to act guarantees that the threat will grow, and the ultimate cost will be higher," Bolton said.

He continued, "Every day that goes by makes North Korea a more dangerous country. You don't like their behavior today? What do you think it'll be when they have nuclear weapons that can be delivered to American cities? ... Today is better than tomorrow. Tomorrow is better than the next day."

<https://www.voanews.com/usa/bolton-military-force-has-be-option-denuclearizing-north-korea>

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Breaking Defense (Washington, D.C.)

Allies Must Press US to Keep New Start: US Experts

By Theresa Hitchens

Oct. 1, 2019

WASHINGTON: US arms control proponents are pleading with NATO and other US allies to more forcefully raise their concerns about a possible move by the Trump Administration to let the New START Treaty lapse.

"The single most important thing that our allies can do is to use every opportunity for communication with President Trump, whether it is face to face or over the phone, to say 'New START matters to our security, to the security of the alliance, to the cohesion of the alliance,'" Tom Countryman, former assistant secretary of State for international security and nonproliferation, told a group of US and allied arms control experts Thursday evening.

Even though John Bolton — whom Countryman called a "serial assassin of arms control treaties" — has left the White House, US experts believe there is still a strong chance that the Trump Administration will fail to extend the New START treaty with Russia when it expires in February 2021. (Bolton himself bemoaned the rise of isolationism in the White House during a Sept. 30 appearance at the Center for Strategic and International Studies.)

New START capped US and Russian deployed strategic nuclear warheads and bombs at 1,550 each. Deployed Intercontinental Ballistic Missiles (ICBMs), Submarine-Launched Ballistic Missiles (SLBMs), and heavy bombers assigned to nuclear missions are limited to 700.

The Trump Administration has been waffling on whether it will pursue a five-year treaty extension (that does not require Senate ratification) with Moscow. Instead, President Donald Trump has ordered his staff to begin work on a possible new trilateral nuclear arms control treaty that would include China — as well as cover sub-strategic weapons (of which the Russians have more than the US) not now covered by New START. Of course, China has soundly rejected all efforts at strategic arms treaties for decades.

Allies, particularly in Europe, are seriously concerned about the knock-on effects of the collapse of the only remaining treaty limiting US and Russian nuclear arsenals. Even the United Kingdom, traditionally the staunchest US ally, has made clear its support for a New START extension.

During Strategic Command's annual conference on deterrence last month, Angus Lapsley, director general of Strategy and International at the UK Ministry of Defence, said London intends to "protect" New START: "A commitment to arms control is critical to maintaining maintaining the cohesion of NATO and help build trust even among rivals."

In particular, the allies are worried about the effect of the end of New START on the multilateral Nuclear Nonproliferation Treaty (NPT). The 1970 NPT pledges all signatory countries beside the so-called P5 nations — the US, UK, Russia, China, and France — to forgo the development of nuclear weapons, in exchange for promises by the P5 that they eventually will give them up.

Only five countries have not signed the NPT: India, Pakistan, Israel, South Sudan and North Korea. However, countries without nuclear weapons have been increasingly agitated by what they see as foot-dragging by the nuclear weapon states on their end of the bargain. The NPT itself is up for review next year.

Bruce Blair, co-founder of Global Zero and a long-time proponent of nuclear disarmament, said that while US allies are traditionally loathe to publicly chide Washington, NATO countries are now "having a free-wheeling debate" about the future course of European security in the face of what they see as an increasingly unreliable and isolationist America.

"One of the silver linings of the Trump Administration has been that a lot of the conventional, standard positions that have been expressed by our allies have no resonance any longer in the context of chaos," he said. "And the environment is very ripe for a very candid discussion about the roles of the NATO allies, US leadership and the future of arms control."

The meeting, at the Norwegian Embassy here, was part of a US visit by the Elders, a group of former heads of state and senior United Nations officials — originally formed by South Africa's Nelson Mandela — who work together for peace, justice and human rights. Current members include former Norwegian Prime (and defense) Minister Gro Harlem Brundtland and former Irish President Mary Robinson.

The Elders are publicizing a newly developed plan for how nuclear weapons states could take near-term steps towards nuclear disarmament, Brundtland told the meeting. It includes four key tenets that she called "the 4 D's:"

- Doctrine: An acceptance of the doctrine of 'no first use' — a stance China embraces.
- Deployment: Reducing by one-quarter the number of nuclear weapons operationally deployed.
- De-alert: Taking nuclear weapons off of high alert status; and
- Decrease: Cutting the total number of nuclear warheads owned by the P5 from some 14,000 to 2000, with the US and Russia limited to 500 each. She explained that this level was slightly above the number (311) a 2010 US Air Force study cited as the bottom line for maintaining a posture of minimal nuclear deterrence.

<https://breakingdefense.com/2019/10/allies-must-press-us-to-keep-new-start-us-experts/>

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COMMENTARY

Defense News (Washington, D.C.)

Diverse, Layered Missile Defense Is Key to Killing Drone Swarms

By Steven P. Bucci

Oct. 2, 2019

On Sept. 14, 2019, the Aramco oil facilities in eastern Saudi Arabia were attacked by drones and possibly cruise missiles. While the rebel Houthi movement in Yemen claimed responsibility, few believed this canard. American, British, French, German and Saudi intelligence officials all point to Iran as the culprit. This is just the latest of Iran's destabilizing actions in the region.

The oil field attack was significant, as it cut Saudi oil production in half — a significant hit to the world's production. Tensions in the region have been higher than usual in the face of the ongoing conflict in Yemen, the American diplomatic and trade pressure on Iran, Iran's hostile actions against shipping (mining two vessels and highjacking others), and most recently "offering" at a U.N. General Assembly meeting to take over regional security responsibilities to get the West to leave the region.

Beyond all that, the West needs to learn some lessons from the attack. Missile defense critics quickly deemed Saudi Arabia's use of the American-made MIM-104 Patriot surface-to-air missile system as insufficient protection for this attack. Perhaps it was, but we don't yet know enough to make that call. Western leaders should not jump to premature conclusions of which weapons and technology were even used or if any of the current defense systems "failed." This helps no one, is opportunistic and could lead to dangerous decisions going forward.

These "trigger happy" naysayers are declaring that in light of the reliability of the Patriot program and other American products, they should be dumped and the Russian S-400 system adopted instead. This is just nonsense. The Patriot is primarily designed to stop high-flying jet aircraft and large ballistic missiles, while drones and short-range cruise missiles fly too low to be effectively detected by the Patriot radar.

But news alert: The S-400 is also not built for hitting low-flying targets. This rank speculation from missile defense critics and further propagated by media that don't understand the complexities of missile defense only emboldens adversaries that are working against the interests of the U.S. and our allies.

In the coming weeks, intelligence agencies are slated to release their findings about the attack, and only at that point should we be considering what needs to be done differently to prevent another attack. The likelihood that the conclusion is to "buy Russian" is, and very well should be, low.

The reality is more likely this: Effective missile defense systems are not based on one weapon capable of stopping everything. Only diverse, layered and integrated air and missile defense systems in combination can combat all types of incoming attacks. Without an interconnected, layered system that can work together and be successfully operated by highly trained personnel, there will be gaps in the coverage — regardless of where or who it's made by. As mentioned, the Patriot was built to protect against high-flying targets, and without integration with other weapons like counter-unmanned aircraft systems that are rapidly evolving, targets like Aramco are not fully protected.

It's not only difficult to believe that a proven system like Patriot that's deployed in 17 countries and has been used successfully in hundreds of combat engagements simply failed, it is also highly

unlikely. We also don't yet know other specifics such as employment techniques and crew-training levels around the oil facilities. All these factors are very likely to add to the complexity of the investigation.

It bears repeating that any one missile defense weapon system alone is not designed to protect against all possible air attacks. Never has that been truer than today, given the growing threat of drone technology — and drones were the key in this attack. We must continue to develop technologies that will detect these types of small, unmanned aircraft and find ways to more effectively protect our assets from these asymmetrical assaults.

The bottom line is that a full investigation into the Aramco attack is necessary to diagnose the problem, and only when that is completed should “corrective” prescriptions be considered. We cannot allow this incident to shift focus on the still-significant and larger missile defense threats we still face.

Additionally, we need interoperability of missile defense systems between allies. This is a time for more concerted efforts to achieve the sort of layered defenses that are truly needed, not for the adoption of outliers such as the Russian systems.

Steven Bucci, former U.S. deputy assistant secretary of defense for homeland defense, is a visiting fellow at the Heritage Foundation think tank.

<https://www.defensenews.com/opinion/commentary/2019/10/02/diverse-layered-missile-defense-is-key-to-killing-drone-swarms/>

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USNI (Annapolis, Maryland)

Rethink Navy Ballistic Missile Defense

By Commander L. Paul James, U.S. Navy (Retired)

October 2019

Last June, Defense News broke a story that the Navy was through with ballistic missile defense (BMD) patrols. This conclusion was based on comments made by then-Chief of Naval Operations (CNO) Admiral John Richardson during the U.S. Naval War College's 2018 Current Strategy Forum. There, he expressed frustration with committing “six multimission, very sophisticated, dynamic cruisers and destroyers” to “a tiny box, defending land.”¹ Missing from this story, however, was his qualifying statement, “I want to get out of the long-term missile defense business and move to dynamic missile defense.” In this assessment, the CNO is on the mark. It is time the Navy gets out of the business of defending static land assets and reconsiders how ship-based BMD capabilities can best contribute to countering the missile threat.

The Navy should change how it employs Aegis BMD-capable ships for three reasons. The first, to which the CNO alluded, is that it underuses a limited asset. BMD ships are mobile, multimission surface combatants. There will never be enough Aegis cruisers and destroyers to meet all operational requirements. This means commanders must assess risk, establish priorities, and allocate resources accordingly. Facing peer or near-peer adversaries, commanders will be required to employ surface combatants when and where they are most needed and will need the flexibility to redeploy them when threats change or opportunities arise. Limiting ships to a single mission in a small geographic area is an inefficient use of a multimission asset and not justifiable when viable alternatives exist.

The second reason is that against a peer competitor or even a moderately competent regional adversary, operating in a constrained geographic area while radiating the powerful SPY-1 radar is not tenable. A ship operating in this manner is comparatively easy to target and vulnerable to threats such as antiship missiles, submarines, suicide boats, and mines. An Aegis ship on station remains formidable but is not invulnerable and would require forces to defend it. This would only exacerbate the lack of surface combatants. The Navy clearly recognizes the threat posed by antiaccess/area-denial weapons, and adopting concepts such as electronic maneuver warfare (EMW) and distributed maritime operations (DMO) aims to increase agility and expand the battlespace. Operating in a tiny box does not align with these concepts.

The final reason is that in most scenarios, ships are not going to be very good at defending land-based assets. This is primarily an issue of capacity. Potential adversaries are fielding missiles of increased range, accuracy, flexibility, and survivability. But beyond the impressive technological improvements, these weapons are being fielded in staggering numbers. U.S. adversaries possess extensive inventories of short- and medium-range ballistic missiles.² With China and Russia, ballistic missile forces are complemented by an equal or perhaps greater number of land-attack cruise missiles. Against these numbers, by 2020 the U.S. Navy will have fewer than 400 Standard Missile (SM)-3s, of which 150 will be the older SM-3 Block I or IA (some nearing retirement age).³ There will be more SM-6s, but their BMD requirements will have to compete with those for air defense and antisurface warfare.

Furthermore, the available Navy-wide SM-3 and SM-6 inventory has to be divided among the various geographic combatant commands and must compete for shipboard vertical launch system space with SM-2 and Tomahawk land-attack missiles. In most cases, a single ship faces an unsolvable math problem. BMD patrols do deter adversaries and reassure allies of U.S. commitment. But the Navy is writing a check it cannot cash. This might be acceptable if there were no alternative. However, defending static land-based assets can be better accomplished by land-based BMD systems.

Time to Redefine Navy BMD

That the Navy is ill-suited to defending land assets does not mean it should abandon BMD. It does mean the Navy needs to rethink the mission and determine how Aegis BMD capability can best benefit the joint force. One area in which the Navy can uniquely contribute is in protecting aircraft carriers and amphibious ships from antiship ballistic missiles (ASBMs). If this sounds like a self-licking ice cream cone, consider the comparative vulnerability of an air base. While the Navy has agonized over the ASBM threat for years, the missile threat to land bases is far greater. It is impossible to move or hide an airbase. China, Russia, Iran, and North Korea all possess large inventories of missiles that can reach forward U.S. bases. Land-based BMD forces are capable and deploy with a greater number of antiballistic missile interceptors, but in a conflict they will be hard-pressed to defend forward bases. This means that a great deal of, if not most, U.S. forward power projection capability will be sea based. To ensure that capability remains survivable will require missile defenses that only the Navy can provide.

The inherent mobility of Aegis ships offers a surge capability. Aegis ships can defend amphibious forces during a raid, an evacuation, or until organic BMD can be established ashore. These ships can defend a port during a force debarkation or a forward-based expeditionary airfield when aircraft are present, or they can augment land-based BMD elements. Finally, Navy ships can surge to augment land-based BMD forces in the event the threat should outstrip the land-based BMD capability or in the event of casualties. Employed as a surge force, BMD ships are a ready deployable reserve for the joint commander, easing ship capacity constraints and risk to the ships.

Shifting the Navy's BMD focus entails challenges. Though the Navy has retained control of ships on BMD stations, they are essentially geographic component commander theater assets. For joint force air component commanders (JFACCs), Aegis ships are their BMD assets, present in theater solely to meet national or regional BMD requirements. Even when land-based BMD forces are present, the JFACC will want to retain these forces to provide additional or backup capability. This may overstate the case, and this tendency may be more pronounced in peacetime when there are no obvious opportunity costs involved with locking an Aegis ship "in a tiny box." But there is no denying that breaking this paradigm will be a challenge. The Navy must explain why refocusing sea-based BMD is not a parochial concern but critical to the joint effort. Given the former CNO's comments, it appears this may be in progress.

Missile Defense in a Larger Context

Rethinking BMD requires changing how the Navy views the mission. Already the threats posed by maneuvering reentry vehicles, ASBMs, long-range cruise missiles, and hypersonic glide vehicles are blurring the distinction between BMD and air defense. Until recently, the Department of Defense treated BMD as a unique mission deserving special treatment. This is no longer practicable. Nor is relying on destroying missiles in flight. The numerical imbalance between threat missiles and interceptors and a punishing cost exchange ratio mean that shooting down all the missiles is impractical and unaffordable, even if air and missile defenses are highly effective.⁴ Therefore, the Navy and the other services must embrace integrated air and missile defense (IAMD) and adopt what the 2019 Missile Defense Review calls a comprehensive approach.⁵ Hard-kill systems must be combined with other offensive attack operations, such as electronic and cyber-attack operations, to counter an adversary's targeting capabilities and kill chain both left and right of launch. While the services have paid lip service to IAMD for years, the time has come to break the rice bowls and integrate the various tools available to counter air and missile threats.

Shifting the Navy's focus to a holistic approach to missile defense, instead of only BMD, and focusing on fleet missile defense and surge capability will require changes to doctrine, organization, training, material, leadership, personnel, and facilities. The first step is to adjust to expanded threats, which now include cruise missiles, unmanned aerial vehicles, and, soon, hypersonic glide vehicles. Instead of focusing on small numbers of missiles launched by rogue states, the fleet will have to prepare for multiple missile salvos. These likely will be employed in structured attacks, featuring dissimilar weapons (ASBM and antiship cruise missiles, for example) and electronic and cyber attacks. The Navy should expect that the enemy will understand the physical limitations of its shipboard systems and will attempt to stress sensor networks, degrade communications, and overwhelm Aegis missile-defense capability and capacity. The Navy's tactics and material systems will have to be adjusted accordingly.

The dilemma posed by large numbers of missiles cannot be solved simply by acquiring more of the systems employed today. As the Navy reorients its focus, it must recognize that the primary objective of air and missile defense is not to shoot down missiles. This is particularly true when defending high-value maritime assets. Targeting the adversary's sensors and communications through a combination of signature control, maneuver, deception, physical destruction, and cyber attacks will be the first line of defense. Offensive actions against the enemy's missile forces and supporting infrastructure will be the second. At some point, however, ships will be unable to remain untargeted, either through error or operational necessity. Ships must be able to defend themselves and the high-value assets for the period required to accomplish the mission.

In the absence of a revolutionary directed-energy weapon, surface-to-air missiles, gun systems, jamming systems, and decoys will remain the tools of this fight. To survive, ships will have to

synergistically employ kinetic and nonkinetic weapons. The complexity of these calculations and the limited decision time will require effective doctrine aided by networked, tactical decision aids.

New Organization and Systems

The threat environment also will force changes in how the Navy organizes air- and missile-defense forces. Since the aircraft carrier emerged as the primary Navy offensive force in World War II, the concept behind air defense has remained largely unchanged. Fighter aircraft and surface combatants form a layered screen for the carrier. Advances in air- and missile-defense technology increased weapons capability, and the size of battle groups decreased, but the fundamental principles of air and missile defense remain the same. Implementing DMO, distributed lethality, dynamic force employment, and EMW will require a different paradigm. One thing is certain—operations will be a far more difficult undertaking than today's BMD deployment. Solving these challenges will require developing not only innovative operational concepts and doctrine, but also intense training at the shipboard, tactical-group, and task-force levels.

Finally, the type of systems the Navy fields also will have to change. Much of the service's focus to date, including recent advances such as the SM-3 Block IIA, represents a joint Missile Defense Agency–Navy effort directed at limited numbers of long-range threats—hence the Navy has procured small numbers of highly capable and very expensive interceptors. The stark reality of comparative missile inventories (offensive missiles versus interceptors) will necessitate a shift to nonkinetic, directed-energy weapons and different (and cheaper) forms of hard-kill weapons. One suggestion from the Center for Strategic and Budgetary Assessments study, *Winning the Salvo Competition*, is to shift from long-range to “lower-cost medium-range kinetic interceptors,” guns, and directed-energy weapons.⁶ While engaging threats at closer range may seem counterintuitive, kinetic antimissile weapons require a predictable flight path to account for interceptor fly-out time, and ship-based electronic-attack and directed-energy weapons cannot be engaged beyond the horizon. One point in the trajectory where the missile's path is highly predictable and in range is in the final moments of flight, when the missile is heading directly at its target. This is nerve-racking for sure, but potentially effective, particularly if decoys and electronic attack can simultaneously be employed with short-range interceptors and directed-energy weapons.

Evolving air and missile threats, the limitations of Aegis BMD ships, changes called for in the Missile Defense Review, and, of course, the former CNO's comments, indicate the Navy must rethink its BMD mission. The new norm will require planning and executing combined air and missile defense in an environment where flexibility is essential, capability distributed, and forces dispersed. The effort will be more complex than heading to a fixed location focused on a single BMD mission. Execution will put a premium on highly trained shipboard personnel and on staffs to understand the mission, the threat, and the range of capabilities the force can employ. It will involve dedicating the necessary time and effort to develop the operational concepts and doctrine that will fully integrate the tools of air and missile defense. Success will require investing in the proper hard- and soft-kill capabilities and training the fleet to employ them. If this seems a high cost, the alternative is less palatable.

1. David B. Larter, “The Navy Is Fed Up with Ballistic Missile Defense Patrols,” *Defense News*, 16 June 2018.

2. Exact missile inventories are classified, but Secretary of State Mike Pompeo has acknowledged that Iran has a ballistic missile inventory numbering in the hundreds (presentation to the United Nations Security Council, 12 December 2018). In *China Military Power, 2019*, the Defense Intelligence Agency acknowledges that China has an inventory of at least 1,200 short-range missiles and unspecified numbers of medium- and intermediate-range missiles.

3. Office of the Under Secretary of Defense (Comptroller)/Chief Financial Officer, United States Department of Defense Fiscal Year 2019 Budget Request—Program Acquisition Cost by Weapon System, February 2018.

4. The cost-exchange ratio is the difference between the cost of the ballistic missile and that of the ballistic missile interceptor and its related systems.

5. IAMD does not refer to simultaneous air defense and BMD hard-kill defenses on board a single ship, but rather to the “integration of capabilities and overlapping operations,” specifically, offensive-defensive integration. See Joint Publication 3-01, Countering Air and Missile Threats, 21 April 2017.

6. Mark Gunzinger and Bryan Clark, Winning the Salvo Competition, Center for Strategic and Budgetary Assessments, 20 May 2016.

<https://www.usni.org/magazines/proceedings/2019/october/rethink-navy-ballistic-missile-defense>

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

Climbing the Escalation Ladder: India and the Balakot Crisis

By Rohan Mukherjee

Oct. 2, 2019

Editor’s Note: This is an essay from “Policy Roundtable: The Future of South Asia” from our sister publication, the Texas National Security Review. Be sure to check out the full roundtable.

On February 14 of this year, a suicide bomber drove a car loaded with explosives into a convoy of paramilitary personnel in the Pulwama district of the Indian state of Jammu and Kashmir. The attack left 44 soldiers dead and around 70 injured. Jaish-e-Mohammad, a terrorist group operating out of Pakistan with the support of the Pakistani military and intelligence establishment, claimed responsibility for the attack. Founded in 2000, Jaish is responsible for some of the deadliest terrorist attacks in Kashmir and elsewhere in India, including attacks on Jammu and Kashmir’s legislative assembly and the Indian national parliament in 2001, and, more recently, attacks on an airbase in Pathankot and an army base in Uri in 2016.

On Feb. 26, 2019, the Indian Air Force launched a retaliatory strike on a location identified as a Jaish training complex near the town of Balakot in the Khyber Pakhtunkhwa province of Pakistan. While India had restricted previous reprisals to parts of Pakistani Kashmir, i.e., to disputed territories, this airstrike was the first to take place on Pakistani soil since the India-Pakistan War of 1971. The following day, Pakistan retaliated with an airstrike in Indian Kashmir that led to an air battle and the downing of an Indian Air Force MiG-21 on the Pakistani side of the Line of Control, the de facto border between the two countries in Kashmir. The government of Pakistan released the pilot of the downed aircraft two days later, thus officially beginning the process of defusing the crisis.

This sequence of events is remarkable for a number of reasons, two of which matter from a strategic perspective. First, in launching airstrikes on Pakistani soil, India deviated from its traditional restraint in the face of Pakistan-sponsored terrorism, visible most prominently in its lack of a military response to the 2008 Mumbai attack by another Pakistan-backed group, Lashkar-e-Taiba, that claimed 164 lives. Second, in seeking to defuse tensions following the air battle over

Kashmir by releasing the Indian pilot, Pakistan deviated from its traditional policy of publicly manipulating the risk of nuclear confrontation to induce Indian restraint and external great power involvement, typically by the United States. As one analyst, drawing an analogy to the Cuban Missile Crisis, put it, “Pakistan may have just blinked.”

How significant are these departures and what are their strategic implications? Pakistan’s efforts at de-escalation are more easily explained than India’s actions. As Ashley Tellis argues, over the years successive U.S. presidents have grown increasingly worried that Islamabad’s inability (and unwillingness) to dismantle the terrorist groups operating from its soil threatens not just India but also American interests in Afghanistan. Washington’s disaffection culminated in the Trump administration’s unprecedented response in the aftermath of the Pulwama attack, which was to publicly support India’s right to self-defense while intensely pressuring Pakistan behind the scenes to de-escalate. China, consistent with its stance toward such crises over the last two decades, and additionally concerned about the fate of the China-Pakistan Economic Corridor, maintained its distance and urged both sides to exercise restraint. Even compared to the 1999 Kargil War, when Pakistan was shocked by the combination of U.S. pressure and Chinese aloofness, Islamabad’s diplomatic options after Pulwama were severely limited.

In contrast to Pakistan, India’s behavior in the crisis requires some unpacking in order to draw out its strategic implications. Seen as an isolated incident, the Balakot strike might seem revolutionary. In the context of the India-Pakistan strategic dynamic over the last two decades, however, it appears more evolutionary.

The India-Pakistan Strategic Dynamic

Although India enjoys unambiguous conventional military superiority over Pakistan, this superiority is diminished by tactical considerations on the India-Pakistan border, as well as by India’s need to defend against a potential attack from China. Moreover, since the nuclearization of the subcontinent in the late 1980s, Pakistan has repeatedly threatened the deployment of nuclear weapons in crises with India as part of its “catalytic” nuclear posture, designed both to deter a major conventional attack by India and to draw the United States and other great powers into any military crisis on the subcontinent. This catalytic posture has allowed Pakistan to sponsor the insurgency in Indian Kashmir and terrorism in India more broadly with virtual impunity.

India’s tradition of restraint toward Pakistan is therefore not the result of a cultural predisposition, as some scholars have claimed, but rather a function of environmental and geopolitical factors, coupled with Pakistan’s manipulation of the risk of nuclear war. When this risk has seemed to ebb, Indian leaders have sought ways to punish Pakistan for its sponsorship of cross-border terrorism. As S. Paul Kapur notes, in the aftermath of the Kargil War, when Pakistan failed to make good on its nuclear threats, Indian civilian and military leaders began to realize that restraint was not their only option. The terrorist attack on the Indian parliament in 2001 thus led to a massive military mobilization on the border with Pakistan. Lessons learned from the incredibly slow pace of this mobilization led to further reforms in Indian military thought and practice, resulting in a limited war doctrine known as “Cold Start,” which envisioned rapid mobilization to capture and hold small amounts of Pakistani territory in retaliation for a major terrorist attack. Meanwhile, India developed an explicit nuclear doctrine resting on three pillars: credible minimum deterrence, no first use, and massive retaliation. Thus, in the event of a major terrorist attack, Cold Start would allow a limited land grab as retaliation, while India’s nuclear doctrine would deter Pakistan from escalating to the nuclear level. Unfortunately, when the time came to deploy the doctrine after the 2008 Mumbai attack, “India froze ... and Pakistan took note.”

Pakistan’s own strategy evolved in response to India’s limited war doctrine. In 2011, Islamabad unveiled a solid-fueled, short-range ballistic missile, the Nasr, capable of carrying a tactical nuclear

warhead and deployed explicitly to counter Indian armored thrusts into Pakistani territory. This development creates a credibility problem for India's nuclear strategy — namely, if Pakistan were to attack Indian troops on Pakistani soil with a tactical nuclear weapon, would India actually retaliate by targeting Pakistani cities? Similar to the logic underlying the presumption of Pakistani non-escalation in response to a limited land grab by India, a strategic nuclear response to a tactical battlefield outcome appears disproportionate and not worth the material and reputational costs.

Consequently, in this post-Nasr world, India has two options in the nuclear domain. The first is to develop tactical nuclear weapons of its own, thus creating an appropriately calibrated response to Pakistan's use of battlefield nuclear weapons. However, India faces significant resource constraints in developing the required number of tactical weapons and significant organizational constraints in developing the command and control mechanisms required to effectively deploy them militarily. The latter constraint, which Pakistan does not face, originates at least in part from India's history of strong and dysfunctional civilian control of the military and nuclear weapons development. Moreover, an exchange of tactical nuclear weapons on the battlefield may still escalate to the strategic level, allowing Pakistan to retain the threat of nuclear war that has paralyzed Indian decision-makers in the past.

Christopher Clary and Vipin Narang highlight India's second option, which is to shift the focus of massive retaliation from civilian to military targets. It would seem far more credible for India to threaten to wipe out Pakistan's nuclear capabilities in response to the use of battlefield nuclear weapons than to hit Pakistani cities. The problem here is that complete success in a counterforce attack is virtually impossible, even in the case of a geographically smaller state such as Pakistan (which has additionally taken steps to disperse its nuclear arsenal and make it mobile). Moreover, if Pakistan is expecting such a response to its use of battlefield nuclear weapons, then it has an incentive to conduct a massive first strike instead. One way for India to address this challenge is to weaken its no-first-use principle and make room for a preemptive strike on Pakistan. Although Clary and Narang argue that top Indian decision-makers are flirting with this idea — and India's defense minister recently seemed to publicly confirm this argument — it still raises the critical issues of whether Indian leaders can credibly commit to striking first (even with counterforce targeting), and if they can be completely successful in doing so.

Climbing the Escalation Ladder

India's nuclear options are, thus, far from ideal, and risk courting even greater strategic instability than currently exists in South Asia. However, thinking of nuclear responses to Pakistan's development of tactical nuclear weapons may be jumping a few steps too far ahead. Herman Kahn's classic work on escalation, which details a 44-rung "ladder" of increasingly escalatory moves that countries in a crisis can undertake to demonstrate resolve, suggests that there are numerous non-nuclear steps that a country in India's position may take before reaching the threshold where nuclear war is thinkable. This threshold is approximately one-fifth of the way up the ladder, whose uppermost rungs involve a nuclear war targeting civilian population centers. In between are actions grouped under categories of increasing severity such as intense crises, limited nuclear wars, exemplary nuclear attacks, and nuclear wars involving military targets. The history of India-Pakistan crises shows that both countries have consistently stayed below the threshold where nuclear war becomes thinkable, i.e., before crises become "intense." Their repertoire of escalatory tactics — increased shelling on the Line of Control, covert operations across the Line of Control, diplomatic maneuvering, significant military mobilization, missile tests as shows of force — falls well within the range of what Kahn calls "subcrisis maneuvering" and "traditional crises."

The escalation ladder is neither an ironclad framework nor a blueprint for crisis management. Rather, it is a heuristic device that can help one think through the options available to countries

and, in particular, gauge escalation and de-escalation behaviors in a crisis or over multiple crises. In the India-Pakistan context, it suggests three important lessons. First, there are numerous escalatory steps available to both countries that have never been taken. Their words to each other and to external great powers notwithstanding, both countries' actions have displayed considerable caution to keep escalation within the non-nuclear realm. Second, and relatedly, Islamabad's rhetoric and fearmongering about nuclear war remains in the realm of cheap talk, as New Delhi discovered during the Kargil War and during the Balakot episode. While one need not assume this as a rule of thumb, it does suggest that there is room for India to operate without bringing nuclear war into the picture.

Third, and most importantly, it is precisely this room to maneuver that the government of Indian Prime Minister Narendra Modi exploited for the first time in the Balakot episode. In Kahn's framework, the airstrike and ensuing air battle can be categorized as a "dramatic military confrontation," or "a direct ('eyeball to eyeball') confrontation that appears to be a stark test of nerves, committal, resolve, or recklessness." What's important about this step is that it is the highest rung on Kahn's ladder before nuclear war becomes thinkable. Until Balakot, neither India nor Pakistan had gone beyond "harassing acts of violence," or illegal acts of violence carried out through clandestine channels. Balakot moved both countries one rung up the escalation ladder, which is both closer to making nuclear war possible but also very far from nuclear war itself.

It is in this sense that Balakot is more evolutionary than revolutionary. In finding greater room for non-nuclear escalation through precision airstrikes that New Delhi was careful to label as "non-military preemptive action," India behaved exactly as a nuclear state demonstrating resolve to a nuclear adversary without courting nuclear war would. The puzzle is not so much why Modi chose this option but why previous prime ministers did not. Long before Balakot, various analysts and practitioners had listed precision strikes on terrorist camps as one of the few viable military options available to India in the event of a Pakistan-sponsored terrorist attack. For example, former Foreign Secretary and National Security Advisor Shivshankar Menon went on the record as advocating precisely this action in the aftermath of the 2008 Mumbai attack.

Menon himself offers a reason why previous Indian leaders may not have considered airstrikes a viable option. In 2008, the Indian leadership calculated that airstrikes would do little to diminish the organizational capabilities of terrorist groups in Pakistan, and would cause the international community to default to their standard response to an India-Pakistan crisis: "split the blame and credit 50:50 in the name of fairness or even-handedness." The difference during Balakot was that world opinion — especially U.S. official opinion — had shifted. In 2016, when Indian special forces carried out a surgical strike on terrorist launchpads in Pakistani Kashmir in retaliation for a terrorist attack at Uri, various countries called for restraint but also exhorted Pakistan to curb terrorist activities originating in territories under its control. By February 2019, two years into the Trump presidency, the geopolitical space for greater escalatory action against Pakistan had further increased. The Balakot airstrike thus represents the conjunction of propitious international circumstances and imaginative coercive diplomacy by the Modi government.

Isolating Pakistan

Aside from military options, much of the policy analysis on India's approach to Pakistan has emphasized the value of diplomatically isolating Pakistan or economically squeezing it through the international Financial Action Task Force. It is worth pausing for a moment to consider whether isolating Pakistan is possible and desirable. If India's goal is to somehow induce Pakistan into giving up cross-border terrorism, the evidence since the late 1980s suggests that both military and non-military coercive measures have short-term effects at best. Pakistan's geopolitical importance to major powers such as the United States, China, Saudi Arabia, and now even Russia has ensured a

steady supply of financial and military resources that is unlikely to abate in the near future. While world opinion may be marshalled against Pakistan as an exporter of global jihad, the major powers are unlikely to push a nuclear weapons state with Islamist domestic political factions and numerous terrorist groups operating in its territory too far.

Indeed India's own security interests are unlikely to be served by a Pakistan that has been economically and diplomatically weakened to the point where the government's domestic legitimacy is threatened. As research on partial democracies has shown, these types of situations are ripe for external conflict, as competing elite groups vie for power through increasingly nationalist appeals. A longstanding and bitter rival next door might serve as a convenient and tempting target for diversionary conflict in these circumstances. India's challenge, therefore is to use economic punishment and diplomatic isolation in specific and targeted ways — not as a general long-term strategy for dealing with Pakistan, but as short-term components of coercive crisis diplomacy.

What Happens Next?

Has Balakot created a new normal, one that increases the risks of war — nuclear or conventional — on the subcontinent? The short answer is no.

Given that India's airstrikes targeted "non-military" targets, and that numerous independent reports suggest they failed to hit them, the response is unlikely to deter terrorist groups and their paymasters in Pakistan. Pakistan's fundamental incentive to rely on cross-border terrorism as a strategy to keep the Indian military tied down in Kashmir — both tactically and in terms of the military's fraught relations with Kashmiri society — remains unchanged. Although India did move up the escalatory ladder by conducting the airstrikes, there is limited room for further action without entering the realm of "intense crises," to use Kahn's term. What Balakot has done is add one more item to the menu of non-nuclear options available to India when contemplating retaliation for a Pakistan-sponsored terrorist attack. The menu otherwise remains the same and will inform decision-making when the next major terrorist attack occurs. India and Pakistan are therefore no closer to nuclear war — an outcome both sides would strenuously wish to avoid — than they were before Balakot. They do, however, now live in a world where more forms of escalation short of major conventional war may be possible.

India for its part has crossed a psychological threshold. Whereas previous governments flirted with the idea of escalation or conducted it covertly, the Modi government, in its first term, publicly demonstrated greater resolve than its predecessors on at least three important occasions: the surgical strikes of 2016, the military standoff against China at Doklam in 2017, and at Balakot in 2019. In each case, the Indian military acted with unexpected boldness, taking the adversary by surprise and courting risk in a controlled manner. The evidence is mounting that Modi's approach, at least in this realm of security policy, has overturned long-held Indian beliefs about the prudence of restraint and not pushing the limits of competitive risk-taking. The importance of Modi, and by corollary Trump's policy toward Pakistan, also highlights the somewhat contingent set of circumstances that permitted the Balakot strikes. Given that the basic terms of the strategic interaction between India and Pakistan are unchanged, a different set of circumstances involving, for example, a less adventurous Indian prime minister and/or warmer relations between the United States and Pakistan would likely dampen any Indian desire to move up the escalation ladder in a future crisis.

Lessons from Balakot

Ultimately, any response to a future terrorist attack sponsored by Pakistan on Indian soil will have to include the careful weighing of the costs and benefits of coercion. In this regard, the actual

circumstances of the Balakot strike offer important lessons for India. The strike did little to alter Pakistan's fundamental strategic calculus about the utility of cross-border terrorism. While it succeeded in demonstrating Indian resolve, India was unable to dominate the escalation ladder at this level, as Pakistan launched its own airstrikes on "non-military targets" the very next day. India's execution of the entire confrontation left much to be desired: Not only did the Indian Air Force lose an aircraft and have a pilot taken prisoner, it also inadvertently shot down a helicopter of its own in the midst of the air battle, killing six personnel and a civilian. After the airstrikes, Pakistan sought to inflict costs on India by closing down its airspace, an act that cost airlines around the world millions of dollars and hit India's national carrier, Air India, especially hard.

Set against these costs, the airstrike had one major upside, which was to give Modi and the Bharatiya Janata Party a boost in the run-up to India's national elections that began six weeks after the crisis. It is unlikely that the airstrike was decisive in the election, and it is certainly not logically tenable that Modi ordered the strike with electoral gain in mind (it could have easily backfired). Yet, the political success of the decision opens up the domestic space necessary for Modi, or a future prime minister, to make a similar decision in a crisis. Pakistan, for its part, also enjoyed a domestic political win with the capture of an Indian pilot and the conciliatory move of returning him to India.

In this sense, Balakot followed in the path of the 2016 surgical strike — in both cases, the two governments had opposite accounts of events and yet were able to use the confrontation to either save face or increase domestic political support. This might be the closest approximation to a new normal in India-Pakistan relations, a change in what Kahn called the "agreed battle" or ongoing conflict between the two countries. Balakot certainly represents a change in the degree to which India is willing to escalate a crisis with Pakistan, but it does not signal a deeper shift in the South Asian strategic environment.

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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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