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Feature Report

“The Korean Peninsula: Three Dangerous Scenarios”. Written by Michael J. Mazarr, Gian Gentile, Dan Madden, Stacie L. Pettyjohn, and Yvonne K. Crane; published by the RAND Corporation; may 30, 2018

<https://www.rand.org/pubs/perspectives/PE262.html>

This perspective summarizes detailed analytical work on the implications of a large, survivable North Korean nuclear force; the challenges of North Korean artillery that can threaten Seoul from the Kaesong Heights; and the issues attendant to a potential mission to secure loose nuclear weapons after a North Korean collapse. We analyze the risks of each contingency on its own as well as how they might interact with one another to create exceptionally dangerous, operationally demanding scenarios. Our work suggests that these three major challenges are complicated by two others—the logistical burden and local chaos of a noncombatant evaluation operation and the potential for third-party intervention, especially by China. Our most important finding is that the United States must develop and work with regional allies to shape a wider range of potential diplomatic and military options to deal with North Korea. This conclusion creates particular implications for the Army, as the core missions involved—including deterring a major war, conducting intensive operations short of major war, and securing weapons of mass destruction in the event of instability—will place massive, perhaps unsustainable, demands on Army capacity and specific high-demand, low-density capabilities. The Army, together with senior Department of Defense and U.S. government leaders, must rethink fundamental assumptions about the strategies and concepts the United States would use in Korean contingencies.

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NUCLEAR WEAPONS

Defense News (Washington, D.C.)

New Sub-Launched Nuke Clears Congressional Hurdle

By Joe Gould

June 13, 2018

WASHINGTON — The U.S. Senate voted Wednesday to scuttle legislation that would have forced the Trump administration to seek congressional approval for a new low-yield, tactical nuclear weapon.

The narrow 47-51 vote that tabled that legislation—a proposed amendment to the 2019 National Defense Authorization Act—was the latest move in a partisan chess game over development of a new, tactical submarine-launched nuclear missile.

The Pentagon and congressional Republicans advocate for the systems to deter Russia from using its own arsenal of low-yield nuclear weapons, but many Democrats and other opponents see it as lowering the threshold for a nuclear war.

The vote saw only Sens. Susan Collins, R-Maine; Lisa Murkowski, R-Alaska; and Rand Paul, R-Ky., cross party lines to vote with Democrats. It was not enough, and Democrats lost the vote.

The Senate on Wednesday was close to ending debate on its \$716 billion NDAA. That bill contains a provision that would remove statutory restrictions on the U.S. development or deployment of such a weapon without congressional authorization.

That language would grant the energy secretary new authority to carry out the weapon's energy development phase, or any subsequent phase, without Congress' specific approval.

Senate Armed Services Committee ranking member Jack Reed, D-R.I., offered the amendment to preserve congressional oversight.

"It simply maintains the status quo and says if we're going to develop a new weapons system, come to us," Reed said of his amendment before the vote.

"We get to debate it, we approve it or we don't approve it. But the American people can rest assured that this is not something that has simply moved through the administrative channels of any executive — this president or any other president."

The panel's No. 2 Republican, Sen. Jim Inhofe — who stewarded the bill while SASC Chairman John McCain, R-Ariz., is battling cancer at home — opposed Reed's amendment, citing the administration's call for the new weapon in the new Nuclear Posture Review.

"I think we ought to have every capability that the Russians have," said Inhofe, R-Okla. "Of course we won't have that unless we have the low-yield capability. I'd hate to have our country in a position where the only choice we have is to do nothing or to use the high-yield weapons that we don't want to use."

Reed's House counterpart, House Armed Services Committee Chairman Adam Smith, D-Wash., has voiced outright opposition to the weapons.

A vote to pass the Senate version of the NDAA is expected early next week. From there, the sweeping 1,140-page bill must be reconciled with its analogue in the House, where Republicans there parried other Democratic attempts to thwart the new nuclear weapon.

<https://www.defensenews.com/congress/2018/06/13/new-sub-launched-nuke-clears-congressional-hurdle/>

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Defense News (Washington, D.C.)

New \$2.5B Contract Awarded to Manage Nuclear Weapons Lab

By Susan Montoya Bryan, The Associated Press

June 8, 2018

ALBUQUERQUE, N.M. — Overseeing a top nuclear weapons laboratory that has had security and safety problems will be the responsibility of a new management team that includes two universities and a research firm with offices around the world, the U.S. government announced Friday.

The National Nuclear Security Administration chose Triad National Security LLC as the winning bidder to manage Los Alamos National Laboratory, the birthplace of the atomic bomb. Comprised of Battelle Memorial Institute, Texas A&M University and the University of California, the team will begin taking over later this year.

The contract — worth an estimated \$2.5 billion a year — marks a big step as federal officials look to get the lab back on track after safety lapses and missed goals.

The lab in recent years has mishandled plutonium and mistakenly shipped nuclear material to other federal facilities via a commercial cargo plane. It also inappropriately packaged waste that led to a radiation release and a nearly three-year closure of the nation's only underground nuclear waste repository.

Criticism of the lab's safety record has intensified as the federal government pushes to restart production of plutonium cores for the nation's nuclear weapons arsenal.

Following serious concerns about management more than a decade ago, the University of California formed a consortium with Bechtel and other private companies to become Los Alamos National Security LLC.

Problems persisted, however, and federal officials announced in 2015 that the contract wouldn't be renewed due to missed performance goals.

The National Nuclear Security Administration followed up in 2017 with a request for proposals that called for the would-be contractor to foster a "security conscious culture," something watchdog groups have said has been missing at the lab.

NNSA Administrator Lisa Gordon-Hagerty didn't address the lab's previous problems in a statement issued Friday. Instead, she mentioned its history of scientific innovations related to national security.

"The lab will continue to be a critical resource to ensure the future safety and security of the United States as we begin work on new endeavors, like the effort to recapitalize our plutonium pit mission," she said.

Gordon-Hagerty was referring to a recent recommendation by her agency that Los Alamos each year produce at least 30 plutonium cores — the triggers for nuclear warheads.

Production of the cores has been based at Los Alamos since the 1990s, although none have been turned out since 2011 because of safety problems and concerns about a lack of accountability.

At least 50 cores, also known as pits, will be produced each year at the U.S. Energy Department's Savannah River Site in South Carolina under the recommendations outlined in May.

The effort is worth hundreds of jobs and billions of dollars in federal funding that would be needed to either revamp existing buildings or construct new factories to support the work.

The National Nuclear Security Administration said Triad was "the best value to the government when all factors were considered and will provide future stability" for up to 10 years if all contract options are exercised.

University of California and Texas A&M officials said in a joint statement that they were committed to building on seven decades of world-class research and innovation at Los Alamos.

Asked about the lab's troubled history, the University of California's Office of the President said it could not provide any more information about the new management team's plans until the transition begins later this year.

The University of California has played a role in management since the lab's inception in the 1940s as part of the Manhattan Project.

Greg Mello with the watchdog Los Alamos Study Group questioned Friday whether the universities, Battelle and the other companies will be able to keep clear lines of responsibility.

<https://www.defensenews.com/global/the-americas/2018/06/08/new-25b-contract-awarded-to-manage-nuclear-weapons-lab/>

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Defense News (Washington, D.C.)

What Tech Was Used in India's Nuclear-Capable ICBM Test Launch?

By Daniel Cebul

June 7, 2018

WASHINGTON — India tested its nuclear-capable Agni-5 intercontinental ballistic missile June 3, bringing the weapon one step closer to its induction into the Indian Army's Strategic Forces Command, according to a senior scientist close to the project.

The surface-to-surface ICBM, with a range between 5,000 and 8,000 kilometers, was fired from a mobile launcher at 9:45 a.m. local time from the Integrated Test Range on Abdul Kalam Island, located in the northwestern Bay of Bengal off the coast of the eastern Indian state of Odisha.

According to the scientist, the missile's sixth flight test since 2012 "was a text-book precision launch. Every single objective was met."

The Indian Ministry of Defence said that "all the radars, electro-optical tracking stations and telemetry stations tracked the vehicle all through the course of the trajectory."

The Agni-5 is rumored to carry a multiple independently targetable re-entry vehicle, or MIRV, payload capable of carrying multiple nuclear warheads in one re-entry vehicle.

India is thought to be pursuing MIRV technology to match advances being made by Pakistan to ensure it has a survivable second-strike capability that can overcome Pakistani ballistic missile defense systems. It is unknown if the Agni-5's purported MIRV technology was deployed during this test.

MIRV missiles are considered by some to be destabilizing because they incentivize a nuclear first strike, which is one reason why the United States and Russia attempted to ban MIRVs in the abandoned START II Treaty.

Although a key tenet of Indian nuclear doctrine is a no-first-use policy — the promise not to use nuclear weapons in a conflict unless attacked by an adversary using nuclear weapons — the integration of MIRV missiles and changes in Pakistani nuclear posture is signaling a possible change in India's outlook.

In January 2017, Pakistan tested a possibly MIRV missile, the Ababeel, to the concern of nuclear analysts.

"It is hard to deny that India and Pakistan are in a full-blown arms race," Vipin Narang, an associate professor of political science at MIT and a member of MIT's Security Studies Program, said following the test.

India's ongoing efforts to obtain the Russian-made S-400 ballistic missile defense system is also contributing to increasing uncertainty in the region.

But India's latest test also had another audience in mind. Given the Agni-V's longer range, it has likely been designed to provide a nuclear deterrent against China.

The missile will need to complete two more test firings before being declared operational by India's Strategic Forces Command.

<https://www.defensenews.com/space/2018/06/07/what-tech-was-used-in-indias-nuclear-capable-icbm-test-launch/>

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Phys.org (Isle of Man)

Metal-Organic Frameworks: A Breath of Fresh Air for Gas Masks

By Monash University

June 8, 2018

On 7 April this year, a suspected chemical attack on the Syrian town of Douma was reported to have killed at least 40 people and injured up to 500, including women and children. Syria had made its chemical weapons capability known to the world six years earlier, with a public declaration of its intention to use them against any foreign assault. Under Saddam Hussein, Iraq waged chemical warfare against Iran and its own civilian Kurdish population, including the notorious 1988 attack on Halabja that killed 5000 Kurds.

Not even a common gas mask would have spared these victims a ghastly death. Widely used by the military to protect against mustard gas attacks in World War I, the technology in the masks, astonishingly, hasn't been updated since.

When Australian soldiers based in Mosul were exposed to a low-grade chemical attack by Islamic State in April 2017, the Department of Defence realised a 21st-century solution was needed. Searching for someone with the capability to develop an improved canister, it approached Associate

Professor Matthew Hill, the incumbent of an 'experimental' joint appointment between Monash University's chemical engineering department and CSIRO.

Hill – an ARC Future Fellow, 2011 Victorian Young Tall Poppy of the Year, 2012 Eureka Prize winner and 2014 Prime Minister's Prize for Science winner – works 50-50 between the two organisations, taking full advantage of the research capacity of the University's chemical engineering department and the industrial muscle of the nation's science and technology lab.

"The current canisters in gas masks have been used by soldiers since World War I, and haven't been improved since," says Associate Professor Hill.

"They offer virtually no protection from common chemicals like chlorine and ammonia, so we've been commissioned to make a new canister that can. We've already found an improvement up to a factor of 40 using metal-organic frameworks. CSIRO would never have delivered this technology without the involvement of Monash, so we know this relationship is working.

"Once they're on the market, they'll be useful to anyone needing a safer gas mask, including our soldiers, but also firefighters, miners and construction workers."

Metal-organic frameworks: a breath of fresh air for gas masks

In the right conditions, MOFs form by linking metal atoms with organic molecules. Their unprecedented structure offers many potential applications. Credit: Monash University

Metal-organic frameworks (MOFs) is the research linchpin in this innovative relationship. Highly porous materials that make it possible to store, separate, release or protect gases or liquids, MOFs have the largest internal surface area of any known material, and offer a real-world impact as vital as filtering toxic chemicals through a protective mask.

Associate Professor Hill is leveraging the know-how of engineers to make the science of MOFs applicable to useable products, and the 20-year-old MOFs technology is now being scaled up to produce up to 15kg of the material in pellet form – a global first.

"No one else around the world is doing this sort of fundamental science combined with process engineering at scale on MOFs," says Monash's head of chemical engineering, Professor Mark Banaszak Holl. "Applying engineering processes to the chemistry of MOFs while using the facilities of CSIRO, the Australian Synchrotron and the Melbourne Centre for Nanofabrication, all located within a short walk of each other, is something not available anywhere else in the world. This joint appointment, in this specific location, allows Matthew the opportunity to uniquely pursue MOF applications, like the improved gas mask canister, very successfully."

Too small to not coordinate

The joint appointment allows for the pooling of resources within a limited local ecosystem.

"Australia is such a small innovation system that we can't have organisations undercutting each other," says Associate Professor Hill. "Compared to who we're competing against globally, we're a very small country, and it's much better to simply combine our limited resources."

"Matthew couldn't have done his incredible research on MOFs sitting isolated in a chemical engineering department somewhere," says Professor Banaszak Holl.

"And it would also have been impossible to do it sitting purely in CSIRO, because of their industry focus. That's the power of this type of joint arrangement offered in this particular engineering faculty. It's very uniquely placed." From CSIRO's perspective, collaborating closely with Monash gives it direct access to high-quality Ph.D. and postdoctoral students, allowing it to better deliver commercial solutions.

"For CSIRO, this partnership is ideal, as it allows both the in-depth study and commercial exploration of these exciting materials," says Dr. John Tsanaksidis, the research director of CSIRO Manufacturing's Advanced Fibre and Chemical Industries (AFCI) program.

Educating and creating future industry

Another project with clear significance, capturing carbon dioxide out of the air using MOFs, is also working its way into the marketplace.

Dr. Munir Sadiq, who's completing a Ph.D. project under the joint supervision of Associate Professor Hill and Professor Kiyonori Suzuki from Monash's Department of Materials Science and Engineering, combined magnetic nanoparticles with MOFs to demonstrate the capture and release of CO₂ at half the current costs. He's now working in a team developing a prototype that's attracting plenty of interest.

"I'm currently still using CSIRO's facilities to complete the lab experiments needed to prove the technology is 100 per cent commercially viable," says Dr. Sadiq.

As an international student from Nigeria, he speaks highly of his experience within the collaborative and supportive network. "Without the joint appointment, it's highly unlikely these two research areas would have come together to allow a project like this," he says.

Technological entrepreneurship

Despite the progress, Associate Professor Hill believes Australia is still slowly building its capacity to foster this type of technological entrepreneurship. The country has the right people to make it happen, including Chief Scientist Alan Finkel (also a highly successful business innovator), CSIRO CEO Larry Marshall (described as a "serial entrepreneur"), even Prime Minister Malcolm Turnbull, who spent many years as a technology entrepreneur before entering federal politics.

In the research and development space, Associate Professor Hill has one key recommendation. "Universities are pushing for people to engage with industry. So I'd say to anyone who'd listen, don't do it in a way that undercuts CSIRO, because that's a zero-sum game for the country. We don't need two people knocking on the same door asking for the same thing. While it might help one organisation's bottom line temporarily, it takes it straight off the other one – who's probably down the corridor in the same building anyway."

<https://phys.org/news/2018-06-metal-organic-frameworks-fresh-air-gas.html>

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CQ Roll Call (Washington, D.C.)

The Other North Korean Threat: Chemical and Biological Weapons

By John M. Donnelly

June 12, 2018

Pentagon acknowledges armed forces are not ready

Now that the Singapore summit of President Donald Trump and Kim Jong Un is in the rearview mirror, major questions remain, particularly about the part of North Korea's doomsday arsenal that Pyongyang's military is most likely to use in a war, one that can potentially kill millions of people, and one for which the U.S. military is woefully unprepared: chemical and biological arms.

Nuclear weapons will continue to be the top concern. But they are far from the only one. Specifically, U.S. forces in the region lack sufficient medical countermeasures, protective gear and

technology to identify so-called chem-bio agents, Pentagon insiders say. And the troops are insufficiently trained, manned and equipped for such a fight, according to previously unreported Pentagon audits and Army officials. Only about 1 in 3 of the Army's special units that deal with doomsday agents is fully prepared, the service confirmed.

"We are definitely under-invested in countering North Korea's chemical and biological threats," said Andrew Weber, a former head of the Pentagon's chem-bio defense programs. U.S. capabilities are improving, he says, but "we are playing catch-up, especially on the biological side."

The world recoiled this year at pictures of men, women and children choking on chemical gas in Syria, and an American-led coalition responded with airstrikes. Such scenes could play out a thousand times more in a potential chemical or biological war on the Korean Peninsula.

If Kim were to unleash his suspected stockpile of smallpox, to name just one biological agent believed to be in his possession, it could bring back to the world perhaps the deadliest scourge in human history.

"We need to accelerate our readiness efforts, because this is a serious issue," said House Armed Services Chairman Mac Thornberry, a Texas Republican, in a brief interview.

Lethal Stockpile

As for North Korea's chemical arsenal, U.S. intelligence officials have assessed for years that Pyongyang possesses a variety of agents — several thousand tons' worth — that its military can deliver via missiles, artillery, aerial bombs or by commandos on the ground.

U.S. military bases in South Korea, with about 28,000 American troops, are in range of such an attack. So are some 200,000 U.S. citizens living in Seoul, South Korea's capital, as well as millions of South Korean military personnel and civilians.

North Korea's missiles can reach Japan, where about 90,000 Americans are estimated to live, and the western Pacific island of Guam, where roughly 7,000 U.S. troops are stationed.

North Korea's chemical agents include especially deadly ones like the nerve agent called VX, which Kim's assassins are understood to have used one year ago to kill his half-brother in Malaysia.

The Malaysian incident raises the prospect of Kim potentially using chemical or biological weapons against U.S. targets in many parts of the world outside of Northeast Asia if the agent or its components are transportable.

Another perilous chemical believed to be in North Korea's inventory is sarin, one ton of which can kill tens of thousands of people — and one of the agents Syrian President Bashar Assad is suspected of using against his own people, including in the town of Douma in April.

Biological Terrors

North Korea's biological arsenal, meanwhile, is shrouded in more mystery than its chemicals. Pyongyang is believed to possess at least 13 different biological warfare agents, experts say, but how extensively North Korea has weaponized them, if at all, is unclear.

The inventory may include botulism, cholera, hemorrhagic fever, plague, typhoid and yellow fever, U.S. officials say.

But anthrax and smallpox are the two biological agents that U.S. officials are most confident North Korea possesses.

One of the four North Korean defectors who fled south last year had antibodies to anthrax in his system, according to press reports in South Korea.

The South Korean government assessed in 2015 that some of North Korea's biological agents could be weaponized in 10 days.

Of course, U.S. intelligence has been wrong about weapons of mass destruction before, so all assessments should be viewed skeptically.

Still, if only a fraction of the unclassified intelligence reports on North Korea's chem-bio capabilities are true, it is still cause for concern.

Kim's Incentive

If war erupted or even appeared imminent, Kim would be more likely to use biological weapons than chemical ones, and nuclear arms would be his last resort, says Weber, the former Pentagon official.

The reasons are manifold. The North Korean military views chem-bio agents as regular weapons of war, not as arms that are beyond the pale, analysts say. In addition, the North Koreans might think, correctly or not, that the United States would see a chem-bio attack as less severe than a nuclear one and therefore less likely to trigger an all-out U.S. military response.

What's more, North Korea could deploy biological agents stealthily, perhaps by commandos on the ground, in a pre-war phase before a full-scale conflict erupted. A bio attack could sow panic on U.S. bases or among civilians in South Korea or Japan and could disrupt the logistics of U.S. or allied forces.

Biological weapons might have another perceived advantage for Kim. It might not be immediately clear that a weapon had been deployed at all, as reported symptoms could be confused for a naturally occurring incidence of disease. And if the outbreak was deemed to be man-made, assuming such a determination can be made, it might be difficult or impossible to prove who caused it.

Once the shooting would begin in a war on the Korean Peninsula, there is little reason to think Kim would hesitate to use every capability at his command — including chem-bio agents. After all, he is said to have killed his own family members.

While he would have an interest in protecting the lives of enough of his own troops to defend his regime, he might also be willing to sacrifice some of those soldiers, and many of them might be willing to be sacrificed, says Bruce Bennett, an expert on North Korea at RAND Corp., a think tank that gets some of its funding from the Pentagon.

In the event of an all-out war, Kim might be forced to use chemical and biological weapons simply because he lacks sufficient conventional power and does not have enough nuclear weapons to hit all the targets he will need to take out, Bennett says.

If a military conflict were imminent or had begun, U.S. forces would try to take out North Korea's chem-bio arsenal as soon as possible, even pre-emptively. But they might not have enough intelligence on where those agents are hidden, nor the ability to destroy them if they are deeply buried. Plus, there is the risk that a U.S. strike could disseminate lethal toxins that could endanger innocent Koreans or U.S. personnel.

Shortfalls in Protection

Defense Department public affairs personnel say they are sparing no effort to prepare for such weapons.

"In light of the increased level of rhetoric and provocations coming from North Korea, there continues to be emphasis on CBRN [chemical, biological, radiological and nuclear] defense

readiness in both Peninsula-based units as well as those units identified for possible deployment to the KTO [Korean Theater of Operations] in the event of hostilities,” said U.S. Forces Korea in a statement.

The emphasis may be coming too late, many experts worry.

For the U.S. armed forces, a chemical or biological attack would be a nightmare scenario for a number of reasons.

Military equipment must be decontaminated, and protective gear (for people, weapons and vehicles) must be put in place — all while revving up for a military response.

Once it is clear that an attack has occurred, the challenge would immediately be determining what the agent was and responding medically to a potentially large number of affected personnel, assuming it is not too late to treat them.

Anthrax and smallpox are the only two biological agents that U.S. troops in South Korea are known to be vaccinated against, a fact well-known to North Korea.

Moreover, the medical tools needed to treat people affected by biological agents are lacking.

“For a number of agents, we have no medical response capability other than basic medical care,” says Weber, the former Pentagon chief of chem-bio defense.

In some biological warfare scenarios, the symptoms show up long after the dispersal. And by the time people realize they have been hit, the usefulness of protective gear is diminished.

What’s more, U.S. forces probably do not have enough of that gear anyway. The charcoal-lined protective suits set aside for chem-bio scenarios only last 24 hours after exposure and then must be replaced. That means multiple sets are needed for each of the 28,000 U.S. military personnel in South Korea alone.

“If you are going to get into a serious chemical environment, you are going to have to have lots of suits per person, and we are not there,” says Bennett of RAND.

If the North Koreans do have smallpox and if they used it, a lethal outbreak might spread widely.

Smallpox is said to have killed at least 300 million people in the 20th century alone before being eradicated in the 1970s. The lone surviving samples of the virus were supposed to be in the then-Soviet Union and the United States. But North Korea may have obtained some.

A re-release of that scourge into the world would be “a global catastrophe,” Weber says. “It would spread like wildfire.”

‘Not Well-Prepared’

The U.S. military itself has called into question its units’ readiness to respond to a chem-bio crisis on the Korean Peninsula.

First, the Army’s 5,000-soldier force that specializes in responding to chemical, biological, radiological or nuclear (CBRN) weapons is not sufficiently prepared, the service confirms.

In fact, only about 1 in 3 of the 130 units is rated as fully ready, with enough equipment, training and people, the Army says.

Until recently, training for such missions “was set at a lesser priority resulting in associated skill atrophy and reduced readiness of both maneuver and CBRN forces’ ability to operate in a contaminated environment,” Wayne Hall, an Army spokesman, said in a statement.

Guy Roberts, the Pentagon's assistant secretary for nuclear, chemical and biological defense programs, told a Senate panel last November he is "very much worried" about its biological weapons.

"Frankly," Roberts said, "I think this is one area we really are not well-prepared to deal with. And that's one of the things that, if confirmed, I plan on addressing very strongly."

Training Gaps

Pentagon audit reports paint a disturbing picture of the preparedness of U.S. forces for chem-bio war in Asia and beyond.

In an originally secret 2015 report, the Pentagon inspector general, or IG, found that masks, protective suits, gloves and boots were not present in some units, and had not been adequately inspected in others.

An unclassified summary of the 2015 report was released last year.

It said U.S. military units in South Korea "were not issued all required individual protective equipment to defend against chemical and biological agents. Further, U.S. forces were not performing required protective mask maintenance checks and services, maintaining serviceable individual protective equipment, or properly storing individual protective equipment. ... Without sufficient quantities of personal protective equipment, personnel are at risk in a contaminated environment."

Two years ago, yet another IG report disclosed that most audited Army and Marine Corps units in South Korea had failed to train as collective units to perform their missions in the event of chem-bio warfare.

Individual soldiers in one Army brigade had rehearsed functions such as putting on masks and suits and, prior to deploying to South Korea, had incorporated chem-bio tasks in its training as a unit, the IG acknowledged. However, once deployed to South Korea, fully 18 of 19 of the brigade's units, plus another Marine Corps unit that was audited, had not trained to perform their missions collectively as if in a toxic environment, even though that is a military requirement, the IG found.

"If not corrected, the CB [chem-bio] deficiencies discussed in this report increase the risk that U.S. forces stationed in the ROK [Republic of Korea] may not be able to conduct their missions in a wartime environment," the auditors wrote.

Asked about the report, U.S. Forces Korea officials said recently that Army and Marine Corps units are making sure they conduct the required chem-bio training, which they called "the top training priority."

The Pentagon inspector general, though, is withholding judgment for now.

"The only way to verify recommended actions have been taken is through a follow-up audit," said Bruce Anderson, a spokesman for the inspector general, in a statement.

The U.S. shortfalls may not matter in the end, as long as Trump and Kim reach a deal on North Korea's nuclear weapons in the weeks ahead. Such an accord would reduce the chances for war on the peninsula, even if the arrangement would not limit Kim's chem-bio arsenal or his missile inventory.

However, a successful completion of the talks — and a successful implementation of any agreement — would be a historical aberration.

Three U.S. presidents have reached deals with North Korea since 1994, only to see them fall apart later as both sides hurled recriminations.

If these new talks also crumble, it will restart war preparations. And if war comes, it is more likely to at least begin with a different sort of doomsday weapon than the nuclear kind that the world is now focused on.

<http://www.rollcall.com/news/politics/the-other-north-korean-threat-chemical-and-biological-weapons>

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CQ Roll Call (Washington, D.C.)

Senate NDAA Would Mandate Work on Missile Defenses in Space

By John M. Donnelly

June 8, 2018

Though it's unclear whether the military would even recommend effort

The Senate Armed Services Committee voted behind closed doors on May 23 to require the Pentagon to start developing missile-killing interceptors for deployment in space — whether or not the Pentagon agrees.

The provision, by Texas Republican Ted Cruz, has become part of the defense authorization bill being debated now and into next week on the Senate floor.

If the language in the bill were to be enacted into law, it would be the first congressional mandate to develop a space weapon that has long sparked fierce debate, largely because it could cost scores of billions of dollars. And it's unclear whether the military would even recommend it.

If the development effort were to begin, it would be the first such research effort since the Strategic Defense Initiative program launched by President Ronald Reagan in the 1980s, an effort often called “Star Wars” and that ended with the presidency of his successor George Bush. After that, the Pentagon focused mainly on developing and fielding interceptors deployed on land and at sea, though the idea of space interceptors briefly resurfaced, only to fail to gain traction, during the George W. Bush administration.

“This would be the only time Congress would actually be demanding development of space-based interceptors,” said Riki Ellison, founder and president of the Missile Defense Advocacy Alliance and a supporter of the provision.

John Isaacs, an expert on strategic weapons with the Council for a Livable World, an arms control group, said lawmakers who have previously tried to mandate development of space interceptors have seen their provisions diluted or deleted prior to enactment.

“This would be new, it would be significant and it would be a huge expense,” Isaacs said.

Dispensing with Pentagon advice

The committee’s markup was conducted in secret, but the amendment votes are printed in the report accompanying the panel’s bill, a document that was made public Thursday.

Last year’s defense authorization law required development of the space interceptors, but only “if consistent with the direction or recommendations of the Ballistic Missile Defense Review that commenced in 2017.”

That review is meant to take stock of the U.S. military’s gamut of antimissile initiatives and to propose a plan for such efforts in the years ahead.

The document's release has been delayed several times. The most recent projection for a release date had been May. Johnny Michael, a Pentagon spokesman, said Thursday he has no new information on the review's schedule.

The Senate Armed Services Committee adopted the provision on a 16-11 vote. Indiana Democrat Joe Donnelly and Maine independent Angus King sided with all committee Republicans on the vote.

It would "direct the Missile Defense Agency to commence a space-based intercept program notwithstanding the outcome of the Missile Defense Review," according to the committee's report.

Price and practicality concerns

Space-based missile defenses have long been a favorite of Republicans, ever since Reagan first touted them as a possible way to shield the world from nuclear missiles. But the space network's high cost and technical challenges have so far kept them from becoming reality.

"Past U.S. efforts to develop and deploy a space-based missile defense have known many names, including 'Strategic Defense Initiative,' 'Brilliant Pebbles,' and 'Global Protection Against Limited Strikes,'" said Kingston Reif, an expert with the Arms Control Association. "And all have suffered the same fate: cancellation due to insurmountable financial, technical, and strategic obstacles. But like a zombie that can't be killed, the idea keeps coming back."

Cruz noted the provision in a May 25 press release on the authorization bill.

Space-based interceptors "can take out missiles when they are most vulnerable, during the boost phase," he said.

His amendment, he said, "removes the legal hurdle to developing and eventually deploying this protection."

A House GOP aide who supports the idea of deploying interceptors on satellites said the number required is much fewer than during the Cold War and the cost of satellites is less.

However, Todd Harrison, an expert on space and the defense budget with the Center for Strategic and International Studies, questioned the practicality of the proposed system. He said an unaffordable number of interceptors would have to be placed into low-earth orbit just to take out a few enemy missiles.

"The point is, it's just not a good way to do missile defense," he said.

A 2011 assessment by the Institute for Defense Analysis said a space antimissile network could cost between \$26 billion and \$200 billion. A 2012 National Academy of Sciences report said space interceptors would be 10 times as expensive as comparable systems on the ground.

"I have serious concerns about the technical feasibility of interceptors in space, and I have serious concerns about the long-term affordability of a program like that," said Adm. James Syring, then the director of the Missile Defense Agency, at a House Armed Services hearing in 2016.

<https://www.rollcall.com/news/politics/senate-defense-bill-mandate-work-missile-defenses-space>

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MIT News (Cambridge, Mass.)

Explained: Detecting the Threat of Nuclear Weapons

By Meg Murphy

June 8, 2018

Professor of nuclear science and engineering Scott Kemp describes the science behind the search for clandestine nuclear sites.

Will the recent U.S. withdrawal from a 2015 accord that put restrictions on Iran's nuclear program make it easier for Iran to pursue the bomb in secret? Not likely, according to Scott Kemp, an associate professor of nuclear science and engineering at MIT.

"The most powerful insights into Iran's nuclear program come from traditional intelligence, not from inspections by the International Atomic Energy Agency," says Kemp.

But covert nuclear-weapon programs, whether in Iran, North Korea, or elsewhere in the world, are a major unsolved problem, according to Kemp. He recently explained the technical challenges involved in the hunt for clandestine sites. And he floated a possible solution.

What inspectors look for

Inspectors want to search for the secret production of plutonium or highly enriched uranium, says Kemp. Manufacturing an actual explosive device can be accomplished quickly and discreetly once either of these ingredients is secured in enough quantity. "The assembly work can be done in an office building, underground facility, or even in a big kitchen. It's nearly impossible to detect once the program reaches this point."

The good news, relatively speaking, is that manufacturing these explosive materials can leave telltale clues.

"All international efforts to prevent nuclear proliferation focus on preventing the production of plutonium and highly enriched uranium," says Kemp. "The hope is to stop the material from ever being produced in the first place, or at least in sufficient quantities to make a nuclear bomb."

What are the telltale clues of covert production?

"The production of either plutonium or highly enriched uranium is a major operation that requires people and time," says Kemp. The involvement of many people means traditional intelligence has some chance of finding the program. But traditional intelligence can be unreliable, especially in closed societies like North Korea. Technical mechanisms would provide a useful overlay.

Detecting plutonium production, Kemp says, is easier than detecting enriched-uranium production for several reasons. The first clue is the heat signature. "Nearly all plutonium production occurs in nuclear reactors, and they obviously produce a lot of heat," he says. "There are clever things a country could do to hide the heat signature, but they are not simple. Infrared satellites can search for waste heat leaving buildings, or being pumped into rivers or oceans.

A second clue comes from chemical signatures. The processing of reactor fuel to extract plutonium creates chemical effluent, which could be another promising detection pathway. "In addition to plutonium, the nuclear reactor will also produce a mix of other radionuclides — and while most are trapped in the reactor, a few leak out to the environment," says Kemp, "especially the noble gases, such as radioactive isotopes of xenon and krypton."

Scientists may be able to detect these isotopes — xenon-131, xenon-135, and krypton-85 — when they seep into the environment. "Governments already use detectors to look for those small

signatures of the operation,” he says. “But a country could do all sorts of fancy things, like cryogenically freezing the off-gas, to eliminate the chemical signature if they wanted to. So we may or may not find signs of plutonium production this way.”

And what about uranium enrichment? “It also produces a distinct chemical signature,” says Kemp, which is caused when uranium hexafluoride (UF₆) gas leaks into the atmosphere. The probability of a leak is very small, but it happens. When the gas escapes into open air, water vapor causes it to decompose into hydrofluoric acid and a specific kind of dust-like aerosol. The hydrofluoric acid is not useful in terms of detection. It is too reactive and disappears whenever it touches dirt, or a building, or a tree. “You are not going to detect it at any meaningful distance,” says Kemp. But the other byproduct, the dust-like aerosol, is another story.

A new way to track secret nuclear activity

The dust produced by uranium enrichment is an aerosol called uranyl fluoride (UO₂F₂), and it has a chemical form that is unique to uranium processing operations, says Kemp. He is interested in working with his colleagues on the engineering faculty to develop detectors that can identify the molecule's distinctive chemical bonds. “There are many techniques for identifying molecules, but the sensitivity required in this case is exceedingly high, and the aerosol form presents a number of other challenges,” he says.

“If we could come up with extremely sensitive detectors that are cheap enough to put around a country without a lot of fancy equipment or maintenance, we would make significant inroads into the problem of detecting clandestine uranium-enrichment programs.” Imagine, he says, something like small weather stations with a solar-powered box that has a tamper-proof seal on it. It has a tiny fan that blows air over a sensor that searches the telltale U-F bond, and then sends an alert signal if the molecule is detected.

“After a localized detection, you could use weather data to project backward and estimate the most probable places this molecule came from. If you could eventually narrow it down to a few buildings or a couple city blocks, then it would be feasible for international inspectors to request access under existing legal provisions to see what is inside.”

A return to the politics

The ongoing presence of the International Atomic Energy Agency, which monitors Tehran's most sensitive factories and research labs, is provided for by the long-established Treaty on the Non-Proliferation of Nuclear Weapons, or NPT, which Iran is unlikely to withdraw from, says Kemp. That means inspection teams can continue to check known nuclear facilities as before.

However, a special provision, called the Additional Protocol, has allowed the IAEA to have wide-ranging access over the past three years, including the right to venture out to investigate tips about suspicious sites. This provision also permits the IAEA to deploy environmental sensors of the kind Kemp wants to build. It is these extra privileges that would be at risk if Iran withdraws from the 2015 accord, says Kemp. The IAEA has used these privileges to make at least 60 visits to facilities that are not part of Iran's declared nuclear program.

“But politics ultimately drives this in the end,” he adds. “If inspectors learned something, whether from intelligence or sensors, but were refused the additional access needed to follow up on the lead, then the international community would probably presume the worst. It would therefore still be in Iran's interest to provide follow-up access even if they did not technically have to — that is, unless they were really hiding something.”

<http://news.mit.edu/2018/explained-detecting-threat-nuclear-weapons-scott-kemp-0608>

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US ARMS CONTROL

Phys.org (Isle of Man)

More Harm Than Good: Assessing the Nuclear Arsenal Tipping Point

By Kelley Christensen, Michigan Technological University

June 13, 2018

One hundred. That's the number researchers argue is a pragmatic quantity of nuclear weapons for any nation to have.

To put that number in perspective, the U.S. and Russia each currently have thousands of nuclear weapons. Both nations hew to the concept of nuclear deterrence—more firepower is intimidating and makes other countries think twice before picking a fight.

More than 100 nuclear weapons in a nation's arsenal does more harm than good—as using them can destabilize the country that uses them even in a best-case scenario.

Joshua Pearce, professor at Michigan Technological University, and David Denkenberger, assistant professor at Tennessee State University and director of Alliance to Feed the Earth in Disasters (ALLFED), co-authored an article published today in the journal Safety.

In "A National Pragmatic Safety Limit for Nuclear Weapon Quantities", Pearce and Denkenberger examined direct negative physical consequences of the use of nuclear weapons to the nation firing them, including impacts such as starvation and global supply chain disruption coupled with the cost to maintain an extensive arsenal.

To summarize: A nation willing to use its nuclear weaponry against another must determine whether it has the ability to survive the problems of its own making.

There are nine nuclear weaponized nations: the U.S., Russia, the United Kingdom, France, China, India, Pakistan, Israel and North Korea. There are approximately 15,000 nuclear weapons globally. Under the disarmament proposed in the paper, this number would drop to 900 or fewer.

"With 100 nuclear weapons, you still get nuclear deterrence, but avoid the probable blowback from nuclear autumn that kills your own people," Pearce says. "Defense expenditures post-9/11 show we care about protecting Americans. If we use 1,000 nuclear warheads against an enemy and no one retaliates, we will see about 50 times more Americans die than did on 9/11 due to the after-effects of our own weapons."

Pearce notes this is the first study to quantitatively demonstrate just how dangerous the use of nuclear weapons is even for the aggressor nation that fired off the nukes.

After-effects of nuclear aggression

In the paper, Pearce and Denkenberger write, "No country should have more nuclear weapons than the number necessary for unacceptable levels of environmental blow-back on the nuclear power's own country if they were used."

The consequences of environmental blow-back include a significant drop in global temperature because of soot from nuclear blasts blocking the sunlight from reaching Earth's surface, decreased precipitation, a drop in food production because of blocked sunlight and less moisture, increased

ultraviolet radiation resulting from a badly damaged atmosphere, and non-functioning supply chains.

More harm than good: Assessing the nuclear arsenal tipping point

A table from the paper details the number of starvation deaths that could be expected based on the millions of tons of smoke created by nuclear blasts of varying sizes. Credit: Joshua Pearce and David Denkenberger

"We should be clear this analysis represents a severe underestimate on the number of dead Americans," Pearce says. "We assume severe rationing, which is the best way to keep the most people alive when there is this level of food shortage. It means anyone who would die of starvation is immediately cut off from food.

"I don't think rationing would go overly smoothly—a lot more people would die in violence internally than what we estimated based on lack of calories."

Putting numbers to the evaluation, Pearce and Denkenberger examined the threat potential of a 7,000-weapon arsenal, a 1,000-weapon arsenal and a 100-weapon arsenal. Playing out a hypothetical scenario, the researchers explain that if the U.S. used 100 nuclear weapons against China's most populous cities, initial blasts would likely kill more than 30 million people. This would kill a higher fraction of the population than even severe pandemics, providing plenty of deterrence to prevent another nation from attacking. Sunlight would decrease 10 to 20 percent and precipitation 19 percent (and in some places, even more).

Pearce and Denkenberger, based on previous work, built a model of the burnable material in cities, how much would burn in a nuclear attack, how much of that would turn into smoke, and how much of that smoke would make it into the upper atmosphere. Then they used the result of climate and crop simulations to predict the impact on food supply. They coupled this with food storage to predict how many people would starve.

The agricultural loss from this so-called "nuclear autumn" would range from 10-20 percent, enough to cause widespread food shortages in wealthier nations and mass starvation in poorer nations.

Starvation could result because nuclear weapons would cause cities to burn, putting smoke into the upper atmosphere and blocking sunlight for years. This could cause lower rainfall and lower temperatures, potentially causing winter-like weather in the summer, called "nuclear winter." Less severe reduction in sunlight is called "nuclear autumn," which could still cause many millions of people to starve.

It is clear that even 100 nuclear weapons is more than enough to dramatically reshape the globe, and Pearce and Denkenberger argue it's also more than enough to deter other countries. Maintaining more than that number, the authors state, is not only against the best interest of a nation to protect its people, but also cost a significant amount to maintain.

Policy recommendations

In addition to a large arsenal reduction, Pearce and Denkenberger make other policy recommendations. They argue that the Department of Defense should extend its nuclear disaster modeling past the initial blast to include potential deaths caused by nuclear autumn.

Says Denkenberger: "The U.S. government should greatly increase focus on producing alternative food to provide for survivors in the case of nuclear war; with supply chains cut-off, all food Americans eat will have to come from within the nation's borders."

"It is not rational to spend billions of dollars maintaining a nuclear arsenal that would destabilize your country if they were ever used," Pearce says. "Other countries are far worse off. Even if they

fired off relatively few nuclear weapons and were not hit by any of them and did not suffer retaliation, North Korea or Israel would be committing national suicide."

<https://phys.org/news/2018-06-good-nuclear-arsenal.html>

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The Conversation US (Boston, Mass.)

The US Nuclear Arsenal: A Quick Overview

By Jeffrey Fields

June 13, 2018

Meeting with U.S. President Donald Trump on June 12, North Korean leader Kim Jong Un committed to "complete denuclearization of the Korean Peninsula."

I spent many years working on nuclear nonproliferation at the Department of Defense, the State Department and nongovernmental organizations. Between 2009 and 2010, I worked with the special representative for nonproliferation at the State Department.

As the world focuses on North Korea's nuclear weapons, this seems like a good time to ask: Is the U.S. doing anything to limit the size of its own nuclear arsenal?

Commitment to disarming

The United States is one of five recognized nuclear weapons states – including Russia, China, France and the United Kingdom – under the 1970 [nuclear Nonproliferation Treaty][<https://www.un.org/disarmament/wmd/nuclear/npt/>]. The treaty permits these states to possess nuclear weapons. Other countries signed on as non-nuclear weapons states, pledging not to pursue nuclear weapons in exchange for access to peaceful civilian nuclear technology like power reactors.

This was not meant to be permanent a state of affairs. An article of the treaty calls on all nuclear weapons states "to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament."

To this end, President Barack Obama pledged to decrease the role of nuclear weapons in U.S. national security strategy, committing to "seek the peace and security of a world without nuclear weapons."

Obama was the first president to talk about steps to disarmament this way.

By contrast, in December 2016, President-elect Trump tweeted that the U.S. need to "greatly strengthen and expand its nuclear capability until such time as the world comes to its senses regarding nukes."

In 2018, the Department of Defense released a review of the role of nuclear weapons in U.S. defense strategy, known as the Nuclear Posture Review. It recommends the U.S. add to its arsenal a new low-yield submarine-launched ballistic missile and a new nuclear sea-launched cruise missile.

The recommendation struck many observers as a pivot from the Obama administration's policies toward an increased role for nuclear weapons. They view it as the beginning of a new arms race. Others see it as necessary to maintain a credible nuclear deterrent and consistent with past administrations' nuclear policies.

The Obama administration had also come to the conclusion that even if disarmament was an ultimate if distant goal, many of the components U.S. nuclear arsenal still needed to be maintained and updated. The Congressional Budget Office estimated that modernizing current U.S. nuclear forces would cost US\$1.2 trillion over the next 20 years.

US arsenal over time

The New START Treaty, signed between the U.S. and Russia in 2010, was another bilateral agreement to reduce the number of strategic nuclear weapons and cap the number of deployed nuclear warheads at 1,550. That may sound like a lot, but at the height of the Cold War, the U.S. arsenal contained more than 30,000 nuclear weapons.

The New START Treaty only places a cap on deployed nuclear warheads, meaning weapons that are on delivery vehicles like ICBMs and ready to use, versus, say, warheads in storage. The stockpile, which is the total number of nuclear weapons both deployed and non-deployed, is much larger. The Obama administration first declassified the number in 2010. The number then was 5,113.

In 2017, the total number of weapons in the U.S. stockpile was reported as 3,822.

The New START Treaty also places limits on the number of vehicles used to deliver nuclear warheads that the United States and Russia can deploy. The United States maintains a so-called nuclear triad: nuclear weapons deployed on ground-based intercontinental ballistic missiles (ICBMs), submarine launched ballistic missiles (SLBMs), and heavy bombers like the B-2 aircraft. Since it would be difficult for an adversary to knock out all three methods of delivery, this strategy allows at least one leg of the triad to respond in the event of a devastating nuclear attack.

The U.S. nuclear arsenal today is the smallest it has been since the early days of the Cold War. Whether this makes the world safer is still a subject of intense debate.

Optimists see any reduction in the size of arsenals as a positive. Pessimists see the continued reliance on nuclear deterrence, whatever the size of states' arsenals, as inherently dangerous. While most nuclear armed states agree that nuclear weapons are only for deterrence and thus likely never to be used in war, their devastating power will always provoke fierce debate on their utility.

<https://theconversation.com/the-us-nuclear-arsenal-a-quick-overview-98046>

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CNBC (Englewood Cliffs, N.J.)

'Now the Real Work Begins:' Experts Weigh in on Trump-Kim Nuclear Pledge

By Tucker Higgins

June 12, 2018

President Donald Trump and North Korean leader Kim Jong Un signed a deal on Tuesday committing the two leaders to establish new ties "in accordance with the desire of the peoples of the two countries for peace and prosperity."

The agreement, which the two leaders signed at the historic nuclear summit in Singapore, has been criticized for being short on detail. Among the four points the two leaders agreed to was the "complete denuclearization of the Korean Peninsula," which experts have said has a different meaning to North Koreans than it does to Americans.

But experts say the next steps in the negotiating process will be key to the deal's implementation.

"It is the steps that follow - or lack thereof - that will determine if this meeting was a success or failure," Kelsey Davenport, director for nonproliferation policy at the Arms Control Association, told CNBC.

YJ Fischer, who worked on nuclear weapons policy at the State Department under President Barack Obama, said: "The most important thing is what comes next."

Below, fourteen experts weigh in.

Catherine Dill, senior research associate, James Martin Center for Nonproliferation Studies

"The most important thing to consider is that working out the details is the hardest part. The 4-point agreement is quite vague, likely intentionally, and now the crucial part that comes next is developing an implementation plan with concrete steps. Supposedly Pompeo and Bolton will continue to meet with North Korean officials in coming weeks to work out the details. After Trump's remarks in the press conference about suspending U.S.-ROK exercises, the U.S. will need to carefully manage the alliance relationship with Seoul as well."

R. Scott Kemp, director of the MIT Laboratory for Nuclear Security and Policy

"This is a perfect outcome. While some may complain that the agreement is devoid of actionable substance—this is fine. Neither Trump nor Kim were in a position to discuss details. A realistic agreement will probably take years to hash out, as there is much to learn about North Korea's program first. The Trump-Kim statement of principles is exactly what is needed to get started."

Kelsey Davenport, director for nonproliferation policy at the Arms Control Association

"The document Trump and Kim signed is a mediocre reiteration of North Korea's past commitments to denuclearize. It is far too soon to characterize this vague, aspirational pledge as a success or a failure. The critical question is what comes next? It is imperative that this summit is not a one-off meeting and that it jump starts a process that trades concrete actions to reduce and roll back North Korea's nuclear program in return for security assurances. In the follow-on negotiations, the Trump administration should focus on closing the gap between the United States and North Korea on the definition of denuclearization and laying out specific, verifiable steps that Pyongyang will take to reduce the threat posed by its nuclear weapons. It is the steps that follow - or lack thereof - that will determine if this meeting was a success or failure."

Steve Andreasen, the director for defense policy and arms control on the National Security Council staff from 1993 to 2001

"The Trump-Kim summit, along with renewed North-South diplomacy, has at least given pause to war. We can always hope for more and more faster, but the reality of where we are today with North Korea is simply this: A new process of dialogue and negotiation will take time. It will be fluid and unpredictable. We will learn more as negotiations unfold that will inform our judgments about what can and cannot be achieved. More likely than not, there will be agreements in stages — and in each case, more than one way to achieve our vital interests, including diluting North Korea's threat to the U.S., South Korea and Japan and avoiding a devastating war on the Korean Peninsula."

James Acton, co-director of the Nuclear Policy Program and a senior fellow at the Carnegie Endowment for International Peace.

"I support diplomacy to reduce the risk of a war, and I would much rather that Trump and Kim exchange civil words rather than nuclear threats. That said, this summit was a farce. The language on denuclearization was weaker than in previous agreements involving North Korea, and Trump appears to have made significant concessions on US-ROK joint exercises without getting anything concrete in return."

Steven Pifer, nonresident senior fellow in the Arms Control and Non-Proliferation Initiative at the Brookings Institution

"This was a good summit for Mr. Kim. He got a sit-down with the American president and, apparently, a suspension of military exercises. Whether this was a good summit for Mr. Trump and for U.S. security interests depends on future steps. Mr. Kim committed 'to work toward' complete denuclearization of the Korean Peninsula. What that means in reality remains to be seen."

Togzhan Kassenova, Nuclear Policy Program fellow at the Carnegie Endowment for International Peace

"When you strip all the theatrics, there is not much substance to celebrate. Only if the follow-on engagement results in something tangible – North Korea's firm commitment to denuclearization, ways to verify it, and a strict timeline with the milestones, would we be able to say the summit was worth it. As of this very moment, North Korean leader Kim Jong Un has a reason to feel pleased with the summit. President Trump doesn't."

Sergey Radchenko, professor of international relations at Cardiff University

"For the moment I think there's too much excitement here for no good reasons. Of course it's great that the two leaders have met ... But in the long term I would say that trust in North Korea to fulfill its obligations or to stick to the letter of agreement is not a very reliable prospect."

YJ Fischer, former assistant coordinator for Iran nuclear implementation at the State Department

"I think the most important thing for readers to be considering going forward is that this was the first step in what is going to be a long process. The vagueness of the statement signed by President Trump and North Korean leader Kim Jong Un indicates just how much work there is still to be done. The two sides still need to agree on principles of disarmament, a timetable for implementation, and stringent verification measures -- or put another way, all the hard work remains to be done."

"The fact that so little was achieved is OK. Diplomatic processes such as these take time. President Reagan and Soviet Premier Mikhail Gorbachev took three years and three high-level summits to reach an arms control agreement. President Nixon's meeting with Chinese leader Mao Zedong was important but it took six more years until relations were normalized with China."

"The most important thing is what comes next. It would be a mistake to rush to schedule a White House level summit between Trump and Kim anytime soon. Instead Secretary of State Mike Pompeo should continue the meetings at his level to reach agreement around the key issues. The Pompeo level meetings don't need to solve everything but the next time Trump and Kim meet there should be a greater foundation for the framework of an arms control agreement."

"The Trump administration should also use this time to work closely with the players in the region, including Japan and especially China and South Korea. Trump touted the success of his 'maximum pressure.' Well the era of maximum pressure is over because China and South Korea want reduced tensions and greater economic collaboration with North Korea. If Trump changes his tune on North Korea, he is unlikely to have China and South Korea with him. That's why it's essential that Trump ensures the three countries stay closely aligned."

Laicie Heeley, editor-in-chief of foreign policy magazine Inkstick, and host of the podcast Things That Go Boom

"The summit was an exercise in pageantry that one can only hope will lead to meaningful progress down the road. At this point, unfortunately, the Kim regime has not agreed to additional concessions, leaving the details of its previously stated commitment to 'denuclearization' to be

worked out down the road. And while both leaders will tout the success of the summit at home, Kim walks away at a clear advantage, having met as a nuclear-armed equal with the president of the United States and been guaranteed a 'freeze for freeze' agreement the U.S. had previously eschewed. That said, Trump didn't give up the farm, as many feared he would. While his characterization of joint military exercises as 'provocative' was unnecessary and plays, once again, into Kim's narrative, the step to freeze such exercises is easily reversed. For now, the two countries remain engaged in amicable diplomacy, which is far preferable to talk of 'fire and fury' and 'dotards' on Twitter.

"Now, the real work begins. Trump and Kim have agreed only in principle to real progress. First and foremost, the two leaders must agree to a clear, shared, and detailed definition of denuclearization. Diplomacy is a long, hard path, but worth the effort. I hope to see the Trump administration continue to engage in a constructive way."

Frank N. von Hippel, senior research physicist and professor of public and international affairs emeritus at Princeton University's Program on Science and Global Security

"There is not much for a nonproliferation expert to say yet because there are no specifics, but I am glad we are negotiating rather than making nuclear threats.

"I do think that a deal is possible but also that it will be a long time before we see the DPRK fully eliminate its nuclear and missile capabilities.

"That is not a technical judgement – technically it could be done relatively rapidly with full DPRK cooperation – but politically, DPRK's nuclear capability is its main asset and it is hard to see it giving that away before there are a lot of other changes.

"In that regard, I think that suspending the annual US-ROK wargames is a good move on Trump's part. Those games were very aggressive and included nuclear threats. We can maintain readiness in less scary ways."

Sharon Squassoni, former director of policy coordination in the State Department's Nonproliferation Bureau

"The statement gets the relationship off the ground. Secretary Pompeo and his North Korean counterparts will take up four baskets of issues in the future: diplomatic relations, security and peace on the Peninsula, denuclearization and efforts to recover POW/MIA remains. Trump and Kim made personal commitments to security assurances and denuclearization but the statement didn't say how, why or when.

"There was no reference to a peace treaty, which will be a tricky effort, but it will likely be part of the follow-on negotiations. And, there was no reference to complete, verifiable, irreversible denuclearization. Thankfully, this suggests a more practical approach to reducing the risks from Kim's nuclear weapons. However, the linkage of denuclearization to the Kim-Moon summit document could mean that the United States might be kept at arms-length in that process. Of course, South Korea has to play a key role in building peace and security on the Korean peninsula, but the nuclear weapons that Kim worries about are American."

Eunjung Lim, assistant professor at the College of International Relations at Ritsumeikan University

"The statement was reaffirming the Panmunjon Declaration [between North and South Korea], and explicitly clarifies the DPRK as the subject who should commit to work towards 'complete' denuclearization of the Korean Peninsula. Since the 1992 Joint Declaration of Denuclearization of the Korean Peninsula, South Korea has removed every nuclear weapon, which means that the remaining task is for North Korea. That is why, I think, this specific sentence is tremendously important."

Richard Nephew, adjunct professor and senior research scholar at Columbia University's Center on Global Energy Policy

"Setting aside the implications of Trump's apparent decision to cancel future U.S.-ROK military exercises due to their 'provocative' nature and expense, the summit largely conformed to my expectations.

"One fear I had in advance of the summit was that Trump and Kim would commit to continue negotiating directly at their level, which would have created the real risk of inadvisable U.S. concessions with respect to the technical aspects of the DPRK nuclear program. Consequently, the most important element of the statement that Trump and Kim signed was the delegation to Pompeo and 'a relevant high-level DPRK official' to continue the negotiations, ensuring that there will be a reversion to more technical and detailed talks.

"Any realistic resolution to the DPRK nuclear and missile threat will require complex negotiations regarding any restrictions and dismantlement activity to be undertaken, verification measures, and sanctions relief.

"This will take time and the process needs political space in both countries. The tasks now, especially in light of the exercises decision and de facto moratorium on new sanctions, are all reassurance and coordination on the content of the actual agreement to be negotiated. This is the most important next step, since the exercise decision and its casual, offhand announcement are going to terrify our allies in the region and beyond."

Weizhen Tan and Yen Nee Lee contributed to this report.

<https://www.cnbc.com/2018/06/12/experts-weigh-in-on-trump-kim-nuclear-pledge.html>

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Los Angeles Times (Los Angeles, Calif.)

Would a North Korea Nuclear Deal Be Better Than the One Trump Just Abandoned with Iran?

By Tracy Wilkinson

June 8, 2018

When President Trump turned against the global tide and withdrew from the landmark, multi-nation Iran nuclear deal, he cited its failure to curtail the Islamic Republic's other "malign behavior."

That included Iran's development of ballistic missiles and its support of militant groups beyond its borders.

Now, as he is about to embark on the potentially historic negotiation of an agreement with nuclear-armed North Korea, those criticisms of the Iran agreement could potentially put the president in a bind. He faces a challenge similar to the one President Obama faced in his dealings with Iran.

In the view of much of the international community, North Korea is every bit as guilty of "malign behavior" as Iran, including robust missile production, assassinations of rivals on foreign soil, brutal human rights abuses and efforts to export its weapons technology to other trouble spots.

And yet, the Trump administration has shown little appetite to tackle those other issues. The great irony, experts and diplomats say, is that any North Korea deal will probably be as limited as the Iran deal was: a narrow, laser focus on the nuclear program.

Perhaps even more limited, experts say.

At minimum, that comparison will create an inconsistency that Trump will have to explain. He repeatedly attacked the Iran deal — which was comprehensive and by most accounts successful in doing what it was designed to — as “horrible” and one of the worst ever. So a deal with North Korea has to be better, more far-reaching — and yet it probably can’t be, experts say.

“I really think it would be a mistake to overload the agenda,” Joseph Yun, who until recently served as the U.S. special envoy for Korean policy, testified to a Senate committee this week.

As pressing as issues such as human rights and chemical weapons might be, Yun said, taking them on alongside the enormous complexity of dismantling Kim Jong Un’s vast nuclear arsenal would be a recipe for disaster.

The talks must “concentrate on denuclearization above all else,” he said.

Yun’s comments won quick approval from several Republican senators, whose support in the North Korean negotiations would be valuable to the administration — and who, like Trump, opposed the Iran agreement.

“Look, we’re all about human rights,” Sen. James Risch (R-Idaho) responded to Yun. “But if you try to overload this and try to resolve all these things at once, I think you’re just setting things up for failure.”

One reason Trump felt unencumbered in tossing out the Iran deal, against the advice of most of his national security team, was that it was not a formal treaty ratified by Congress.

Secretary of State Mike Pompeo has made clear that any future pacts with Iran will have to be sanctioned by a treaty.

Thursday, briefing reporters at the White House, he indicated that the same would hold true for a North Korea agreement.

“We’re hoping to submit a document that Congress would also have a say in,” he said.

That move could give a North Korea pact the sort of political support that the Iran deal lacked. But it could also open any agreement to partisan political battling of the kind that the Obama administration hoped to avoid by not handling the Iran deal through a treaty that would require ratification by the Senate.

Nuclear negotiations with North Korea are even more complex than those with Iran. To begin with, North Korea’s nuclear program dwarfs the program that Tehran had and agreed to mothball. Iran does not have any nuclear weapons; North Korea has somewhere between 20 and 60, according to U.S. estimates.

Any agreement to eliminate that stockpile would require detailed negotiation that no one — including, as of recently, Trump himself — expects to see resolved in Tuesday’s summit in Singapore.

“We are literally talking a multiyear process,” said James Carafano, a security and foreign policy expert at the conservative Heritage Foundation, which has advised Trump. “It’s kind of like an arranged marriage. I have very low expectations, and if it works out, great.”

Even if Trump and Kim agree on a basic definition of “denuclearization,” the steps to begin to eliminate Pyongyang’s stockpile are formidable and time-consuming and would require a cast of thousands of experts and inspectors.

Teams would have to be assembled to shut down facilities, dismantle warheads and unravel procurement systems. U.S. intelligence agencies believe North Korea has built a widely dispersed

network of 100 or more clandestine production facilities to create fissile material and testing components, and to assemble and store the actual warheads.

Unlike Iran, North Korea has long been a closed, isolated nation. Inspectors from the United Nations' International Atomic Energy Agency, the group that is monitoring Iran and would be tasked to do the same in North Korea, last set foot in the country nearly a decade ago.

The very first step toward denuclearizing would require Kim to declare what weaponry and materiel he has amassed, and on that he could easily cheat. Critics of the Iran deal argue that Tehran also cheated in its initial declaration because it failed to list archives that compiled much of the technical know-how that Iranian scientists had accumulated.

Some experts say North Korea's status as a nuclear-armed nation is so vastly different from conditions in Iran that comparing the two is a matter of apples and oranges.

"It's very hard to make comparisons," said Robert Gallucci, who led 1994 talks with North Korea for the Clinton administration. "Iran doesn't even have fissile material" used to produce nuclear weapons, he noted.

Suzanne DiMaggio, a senior fellow at the New America think tank in Washington who has been involved in past negotiations, said the administration should use aspects of the Iran deal as a model on issues like multilateral diplomacy, conflict resolution and its intrusive inspection regimen.

"The administration would be lucky to get a deal as good as the JCPOA," she said, using the acronym for the Iran deal — the Joint Comprehensive Plan of Action.

Where North Korea will be looking to the Iran deal is in the prospect of sanctions relief. The Iran deal lifted key international sanctions, allowing the country to rejoin global markets and finance systems and to export oil.

Kim appears to want two achievements from the summit meeting: international recognition and a lifting of his country's isolation, which he has already won; and removal of the international punitive measures that have helped cripple his economy. He is eager to modernize and normalize what has been a backward, impoverished country.

"When [Kim] looks down the road and he sees 10 U.N. Security Council resolutions, maximum pressure 2.0, ... he's seeing that he will not be able to rule for 50 years under those conditions," said Victor Cha, who worked on Asia issues under the George W. Bush administration. "That may be why he's coming to the table."

Regional geopolitics will also figure into how successful the negotiations can be. In the Middle East, Iran has several neighbors that sustain hostilities with the Islamic Republic, another dynamic that eased the way for Trump to abandon the deal.

In Asia, however, a policy favoring war with North Korea "is not viable," said Catherine Killough, a senior fellow at the Ploughshares Fund, an organization that promotes nuclear nonproliferation. Japan and South Korea, as well as China, know that a war would be calamitous for the region.

"I see it as a very convenient moment for [Trump] to have a win in Asia and have a war in the Middle East," she said. "It plays very well to his base."

When Trump left the Iran deal, world leaders, diplomats and foreign policy experts predicted the action would erode American credibility and discourage countries from trusting Washington's promises.

That, however, is probably not an issue in the early encounters with Kim: There is no trust, and it would be a long time in coming, former negotiators say.

Instead, unlike talks with Iran, where most of the international players already were familiar with one another, the Trump-Kim summit will be more about atmospherics, broad principles and what the president has called “getting to know you.”

“I don’t see Kim Jong Un bringing out schemata of his nuclear facilities and talking about how to dismantle them,” said Michael J. Green, senior vice president for Asia at the Center for Strategic and International Studies. “And I don’t see Donald Trump doing that.”

The process will quickly revert to Pompeo and others to “put meat on the bones,” Green predicted.

Pompeo, at the White House, said that Trump would not accept a “bad deal” with Pyongyang.

“The fact that our two leaders are coming to the table shows that the two sides are very serious,” he said. “The diplomatic model we’ve used to date is different from past efforts. ... This is different.”

<http://www.latimes.com/nation/la-na-pol-us-norkor-iran-20180607-story.html>

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COMMENTARY

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

A Way Forward with North Korea: The Comprehensive Nuclear-Test-Ban Treaty

By Stephen Herzog

June 11, 2018

Given the vitriolic rhetoric between the United States and North Korea over the past year, few could have predicted that Supreme Leader Kim Jong Un would choose this time to implement a near-term moratorium on nuclear testing. Yet, here we are. On April 20, Kim announced precisely such a moratorium, along with closure of the Punggye-ri test site and a freeze on ballistic missile tests. Han Tae-song, the regime’s ambassador to the United Nations in Geneva, took the message a step further at the multilateral Conference on Disarmament, stating that the “DPRK will join international disarmament efforts for a total ban on nuclear tests.”

Experts are justifiably skeptical of the prospects for voluntary North Korean denuclearization. However, the regime’s rhetoric raises an opportunity for Kim and President Donald Trump to negotiate a formal end to the controversial testing program that has produced six underground nuclear explosions. One way to do this would be for North Korea to join the Comprehensive Nuclear-Test-Ban Treaty (CTBT).

The treaty has 183 state signatories — 166 have ratified — and bans “all nuclear explosions on Earth whether for military or for peaceful purposes.” Prior to returning to academia, I led U.S. Department of Energy technical delegations around the world to support the CTBT. Our team collaborated with foreign counterparts and the CTBT Organization (CTBTO) to enhance monitoring of nuclear explosions and other geophysical events, as well as prepare for future on-site inspections.

Based on my experience, North Korean accession to the CTBT deserves a hard, thoughtful look in both Washington and Pyongyang. Termination of nuclear tests on the Korean Peninsula is clearly in line with U.S. national security interests, and joining the treaty is a feasible concession for Kim to offer Trump. And the experts of the CTBTO are uniquely prepared to verify the permanent closure

of Punggye-ri. Most importantly, the CTBT offers the best prospects for quickly rolling back elements of the North Korean nuclear weapons program.

With few up-front costs, Kim could signal his goodwill

Contrasting U.S. and North Korean definitions of denuclearization make nuclear disarmament appear unlikely in the next few years. North Korea recoiled at initial suggestions by U.S. officials that the regime should adopt the “Libya model” of complete, verifiable, irreversible dismantlement. Indeed, assessments by the CIA as well as the Pentagon have cast doubts on the possibility of denuclearization. Trump himself has now even tried to walk back expectations for the nuclear diplomacy.

But even if Kim isn’t prepared to give up his arsenal anytime soon, there are good reasons to believe he would be willing to accept the CTBT. Beyond North Korea’s statement in Geneva, Kim’s announcement of the moratorium strongly suggests he would be amenable to the treaty. He declared, “Under the proven condition of complete nuclear weapons, we no longer need any nuclear tests” and “the nuclear test site ... has also completed its mission.” That wording sounds bad for immediate denuclearization prospects, but great for the test ban.

Joining the treaty would also be a demonstration of North Korea’s long-term intentions and goodwill. In the short term, the regime would simply be legally foreswearing the tests Kim says they no longer need. Beyond that, however, Kim would be tying his hands by ending the provocative nuclear testing program.

Calling it quits after carrying out six test explosions would do much more than limit Kim’s ability to send the international community into a frenzy with each test. It would close off numerous opportunities for North Korea to qualitatively improve its nuclear weapons by developing more advanced warhead designs, making weapons smaller and lighter (hence more deliverable), or investigating how to deploy multiple-independently targetable reentry vehicles on missiles. Given the regime’s limited amount of testing data and lack of supercomputing simulation capabilities, these advances would be extremely difficult — or in some cases nearly impossible — without foreign technology transfers.

Since Kim seems satisfied and confident in existential deterrence and the regime’s ability to deliver nuclear warheads mounted on ballistic missiles, adopting the CTBT would be both a very feasible and a very significant concession.

Verification matters

Verification measures, not informal pledges or even treaty texts, are the heart of nuclear arms control. For instance, while the New Strategic Arms Reduction Treaty between the United States and Russia was only 17 pages long, its protocol laid out an additional 165 pages of procedures for intrusive inspections, telemetry, and other verification measures.

North Korea did indeed destroy facilities at its test site on May 24 in the presence of a group of international journalists. But the journalists watching the show were not technical experts in on-site inspection. They were not geophysicists who could analyze local seismic data to measure the magnitude of exploding tunnels to make sure they were actually being destroyed — not just temporarily sealed off. Nor were they versed in multi-spectral imaging to detect terrain abnormalities, or magnetic and gravitational field monitoring to locate hidden underground testing infrastructure and cavities. The journalists watching from afar also weren’t prepared to take environmental samples in the tunnels prior to their alleged destruction, which might help the world understand the activities that have taken place at Punggye-ri in the past.

A series of worrisome reports have emerged in the aftermath of North Korea's publicity stunt. Apparently, the regime rescinded invitations for U.S. and South Korean technical experts to observe the fireworks. Some facilities at the site remain untouched, and personnel may have removed sensitive equipment in the days leading up to the demolition activities. If Kim is serious about the path toward disarmament, verification is sorely needed at the test site. Informal pledges simply will not cut it.

By joining the test ban, North Korea would establish ties with the CTBTO, which is the most qualified organization to verify its test site dismantlement. Many followers of arms control know the organization best for its global International Monitoring System of seismic, infrasound, hydroacoustic, and radionuclide stations that easily detected all six North Korean tests. But the CTBTO also has a dedicated corps of inspectors from around the world with expertise in all aspects of on-site inspection of nuclear tests, from visual observation, to environmental sampling, to drilling. While the treaty doesn't technically permit on-site inspections until it has entered into force (and entry into force is notoriously complicated), to prove his nonproliferation bona fides, Kim could still invite the CTBTO to inspect the test site.

CTBTO Executive Secretary Lassina Zerbo has taken the lead by offering the organization's support to verify the closure of Punggye-ri. In recent weeks, I attended the Second CTBT Science Diplomacy Symposium in Vienna and spoke with numerous CTBTO staffers about this proposition. They reminded me that the organization successfully tested its on-site inspection procedures in major field exercises in Kazakhstan in 2008 and Jordan in 2014. The CTBTO also visited the shuttered French test site at Mururoa Atoll and has carried out on-site inspection training at the former U.S. Nevada Test Site and Soviet Semipalatinsk Test Site.

Other transparency and verification deliverables could, of course, be emerging from ongoing U.S.-North Korean diplomacy. Perhaps the United States or the International Atomic Energy Agency might be given access to inspect limited North Korean nuclear facilities. These could include a centrifuge enrichment plant toured by former Los Alamos National Laboratory Director Siegfried Hecker, who was blown away by its sophistication. Unlike the centralized nature of testing, however, North Korea has widely dispersed its other fuel cycle and weapon activities throughout the country — posing stark verification challenges.

Thus, of all the options on the table, CTBTO verification of the test site's closure should be a top priority. It is well-developed, effectively proven, and the most likely way to comprehensively and impartially verify the elimination of a segment of Kim's nuclear program in the near-term future. If Kim is hiding something at Punggye-ri, the CTBTO will find it.

Joining the treaty raises the stakes politically for Kim

Notwithstanding these points, some critics will contend that it is hardly a concession for Kim to join a treaty outlawing something he says he doesn't need to do. But in addition to limiting North Korea's nuclear advancement as I outlined above, the treaty would place further constraints on the regime in the form of international pressure.

Historically, some states that have chosen not to comply with nuclear arms control agreements have simply refrained from participating in international nonproliferation treaties. North Korea falls into this camp with respect to the CTBT. But in the case of the Nuclear Non-Proliferation Treaty (NPT), North Korea joined and then withdrew, and the international community's reaction offers a hint at the pressure that might come to bear if the regime did the same with the CTBT.

The different treatment of North Korea on one hand, and India and Pakistan on the other, for their noncompliance with the NPT is illustrative. Pyongyang withdrew in 2003 before conducting its first test three years later. Even though the regime wasn't obligated by the treaty, UN Security Council

Resolution 1718 nonetheless levied harsh multilateral sanctions against North Korea for that first test. By contrast, India and Pakistan, which had never been parties to the treaty when they tested in 1998, each received only verbal condemnation in UN Security Council Resolution 1172.

Put simply, the international community doesn't take kindly to states that commit to nuclear treaties and then abrogate their responsibilities. North Korea is already under significant pressure for backing away from the NPT. If Kim signed the test ban and then reversed course on yet another arms control treaty, it would become increasingly difficult for China to shield the regime from the Security Council's wrath.

It's mutually agreeable and a win for U.S. national security

The United States and North Korea appear headed toward a stalemate. The Trump administration's hope to apply the "Libya model" of denuclearization is almost certainly a non-starter in Pyongyang, where Kim counts on nuclear weapons for regime survival. In pursuit of this goal, North Korea has carried out 6 nuclear tests and 117 ballistic missile tests. Looking at Kim's rhetoric, it is clear that he only announced the current moratoria on both types of tests when he had gained confidence in the technical capabilities of his arsenal. Experts are rightly convinced that there is essentially no chance that the regime will suddenly agree to denuclearize or eliminate missiles that raise the risk of mutual vulnerability with the United States.

As such, the negotiators need to focus on obtainable low-hanging fruit. If North Korean denuclearization is going to occur down the road, it will be a lengthy process that requires mutually agreeable confidence-building measures along the way. And getting North Korea to join the CTBT may be a better start than any other proposal on the table.

Regarding the possible outcomes of diplomacy with North Korea, Trump has stated, "The prize I want is victory for the world." Besides preventing nuclear tests that threaten to destabilize the peninsula, it is obviously in the interests of U.S. and global security to lock Pyongyang into arms control commitments and prevent qualitative advancements in its nuclear arsenal.

The American public would almost certainly agree. Recent research my colleague Jonathon Baron and I published in the *Nonproliferation Review* shows that a convincing majority of all U.S. demographic groups (gender, race, income, education, region of the country, political party affiliation, etc.) support Senate ratification of the CTBT. These results, of course, showed support for permanently halting U.S. nuclear tests. It's safe to assume North Korean nuclear tests are even less popular among Americans. Getting Kim to commit to the CTBT could be a major national security policy win on both sides of the aisle.

<https://warontherocks.com/2018/06/a-way-forward-with-north-korea-the-comprehensive-nuclear-test-ban-treaty/>

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The Diplomat (Washington, D.C.)

Time for Global Action against Radiological Threats

By Rajeswari Pillai Rajagopalan

June 9, 2018

As a general proposition, the security of nuclear and radiological materials has been a global concern since the disintegration of the Soviet Union, when there were fears that these materials and expertise from Soviet Union would fall into the wrong hands.

But the issue only really gained serious attention only after the 9/11 terrorist attacks in the United States. In its aftermath of the incident, there were genuine worries that terrorists may get hold of these materials.

The fears are not unfounded – according to the International Atomic Energy Agency (IAEA) Incident and Trafficking Database (ITDB), there were a total of 2,889 confirmed incidents involving nuclear and radiological materials between 1993 and 2015. Though only around 25 countries around the world have nuclear materials in their possession, radiological sources are far more widely available because of their dual-use nature and their use for medicinal, industrial, and agricultural purposes.

While there are a number of radioactive materials, not all pose serious risks. Some of the high-risk category materials include cobalt-60, cesium-137, iridium-192, strontium-90, americium-241, californium-258, plutonium-238, and radium-226. The risks of each of these sources depends on the amount of radioisotope present in the source, the kind of exposure, and the kind of radiation it emits, among other things. Cesium-137 is one of the materials which raises concerns as it is easily available because of its large-scale use in the medical and other commercial sectors. There have been a number of incidents of theft and illicit trafficking of cesium-137.

Radiological material in the hands of terrorists could pose serious risks because it could be used it to develop a dirty bomb, what is called a Radiological Dispersal Device (RDD). Their widespread use makes it impractical to control them. While these materials cannot be used to make weapons of mass destruction (WMD), they could create massive disruption.

An RDD weapon will not result in mass casualties. But they could cause mass panic, especially in places that are densely populated. In addition, these weapons could have economic, psychological, and social impacts. Anne Harrington, the U.S. National Nuclear Security Administration's Deputy Associate Administrator for Defense Nuclear Nonproliferation outlined these in 2014: "An RDD detonated in a major metropolitan area could result in economic costs in the billions of dollars as a result of evacuations, relocations, cleanup, and lost wages."

In addition to RDDs, radiological materials can also be used to make a Radiation Emission Device (RED), which can spread radiation to a large number of people if kept in an enclosed location such as a train compartment.

While national level measures need to be introduced and streamlined, equally important is the need to strengthen global measures to prevent and mitigate the threats from radiological weapons. Given its wide applications in the civilian sectors, maintaining a global inventory of radiological sources through national channels is an important requirement. A national registry of such materials can be made mandatory only if there is collective effort at the global level.

Additionally, monitoring "orphan" materials that have been discarded by hospitals and industries, military and laboratories also need to be brought under a global framework. A serious incident took place in Brazil in 1987 when a hospital that was using cesium-137 shifted to a new campus but carelessly discarded a teletherapy unit in its old premises. The locals who dismantled the unit had no clue of the dangerous material that they were being exposed to, resulting in four deaths.

Asia, too, is not immune from this radiological threat. There has been an incident in Bangkok when an individual was arrested with 66 pounds of cesium-137. There was also an incident in India in 2010 that involved Cobalt-60. Each of these incidents happened due to oversight, improper handling and disposal of radiological sources. All of these are indicative of the flaws in the current systems and regulations and therefore suggestive of the urgent need to write or strengthen global measures for radiological security.

Despite the high-risks from radiological sources, there are no legally-binding mechanisms regulating the spread and use of these sources. The IAEA has, for instance, a non-legally binding

“Code of Conduct on the Safety and Security of Radioactive Sources,” published in January 2004 but these, as the name suggests, are merely suggestions for states to voluntarily adopt. There is an additional document called the “Guidance on the Import and Export of Radioactive Sources,” approved and issued originally in September 2004, which is also not mandatory.

Therefore, one of the first steps that the IAEA members and others must consider are ways to review and strengthen the existing international radiological security measures. Developing a binding agreement for securing radiological materials and expanding the support base for the IAEA Code of Conduct will be the first baby step to developing more holistic measures.

It is a shame that all the IAEA member states are not yet parties to the Code of Conduct. While many countries have argued that there must be a binding Convention developed for radiological security, it is more important to get sufficient endorsements to the existing Code before moving towards a formal, mandatory Convention. Also, given the current state of relations among the great powers, the likelihood of developing consensus, especially for mandatory, legal instruments appears bleak.

Therefore, states must consider simpler and pragmatic steps to control pilferage of radioactive sources especially those used in medical facilities, as they are least protected physically. Better licensing procedures and accounting of materials used in industries and medical sectors also need to be instituted to avoid theft and illegal possession.

Meanwhile, as a long-term solution, states need to work on alternate technologies to reduce dependency on such high-risk sources. The IAEA has, for instance, begun exploring alternate sources to cobalt-60 and cesium-137, which are two of the most widely used radiological materials used in hospitals and industries. But states also need to be given incentives to make the shift from cobalt-60 and cesium-137 to less riskier options.

Last but not the least, there should be a global effort to convening forums such as the Nuclear Security Summit for radiological security that can bring focused attention to an otherwise neglected area of security. Such an initiative could bring multiple stakeholders including industry who could also share their best practices which may help in shaping future instruments.

<https://thediplomat.com/2018/06/time-for-global-action-against-radiological-threats/>

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The New York Times (New York, N.Y.)

North Korea Is a Nuclear Power. Get Used to It.

By Vipin Narang and Ankit Panda

June 12, 2018

North Korea has arrived as a nuclear power, and there is no going back. Once the reality-show theatrics of the Singapore summit meeting subside, we are left with the reality that North Korea was just recognized as a de facto nuclear weapons power.

President Trump went to the meeting with Kim Jong-un of North Korea to try to take the keys to Mr. Kim's nuclear kingdom. Whatever the terms of the statement released at the end of the meeting, Mr. Kim has not committed to anything concrete. He is not surrendering North Korea's nuclear weapons and has walked away the big winner.

North Korea declared its nuclear weapons force technologically complete at the end of 2017, with its third successful test of an intercontinental ballistic missile. Now, less than a year later, North Korea's nuclear power is politically complete, thanks to the legitimacy that comes from a handshake

with an American president. Mr. Kim did what neither his father nor grandfather could do before him: sit down and negotiate with a president of the United States. The Singapore summit meeting looks indistinguishable from a meeting between the leaders of two states with normal diplomatic relations. But this is far from where Washington and Pyongyang have ever stood. It was Mr. Kim's development of nuclear weapons — and the credible means to deliver them to America — that made the meeting possible.

Didn't he just agree to "work towards complete denuclearization of the Korean Peninsula"? He did. Just like his grandfather's deputies did in 1993. That phrase — "denuclearization of the Korean Peninsula" — is a term of art that the United States and North Korea can interpret to suit their interests.

Mr. Trump can walk away claiming that the phrase encompasses unilateral "complete, verifiable, irreversible dismantlement," or disarmament of North Korea's nuclear arsenal. North Korea can interpret the phrase to mean a termination of the American security guarantee and nuclear umbrella to South Korea, or more literally, as universal disarmament by all nuclear countries. And the phrase commits North Korea to no concrete action — especially since it pledged only to "work towards" it. The canyon separating these two ideas of "denuclearization" is wide enough to park all of North Korea's ICBMs. This works to Mr. Kim's advantage.

And presumably, as long as he freezes any further long-range-missile and nuclear testing, Mr. Kim will get at least a short-term freeze on American and South Korean military exercises. That is an objective he has long sought. He views them as provocative, a sign that his enemies are training to overthrow the regime. To his domestic audience, Mr. Kim can now present the end of this provocation as a signal of North Korea's sovereignty and security.

Mr. Kim also leaves Singapore having snuffed out the Trump administration's maximum pressure campaign, a diplomatic initiative that began last spring to expand the multilateral sanctions on Pyongyang. While China did not officially join the campaign, it did severely curtail oil exports to North Korea, a move that Mr. Trump praised on Twitter. Mr. Kim visited Beijing after that, and then publicly acknowledged that he would attend the summit meeting with Mr. Trump. He not only went; he did so with the air of a reasonable and responsible leader, especially after Mr. Trump's May 24 decision to abruptly cancel the meeting.

Having apparently helped get North Korea to the table, it is unlikely that China will ever again agree to a maximum pressure campaign. Tightening sanctions would only destabilize North Korea, and China fears a desperate and broken North Korea on its border more than it fears a nuclear North Korea. Even if sanctions by the United States and the United Nations Security Council remain in place, without additional Chinese implementation, North Korea will find itself enjoying considerable breathing space.

American allies in the region are not so sanguine. President Moon Jae-in of South Korea was taken by surprise by the sudden announcement of an end to joint military exercises. But it is Prime Minister Shinzo Abe of Japan who is perhaps most terrified, because United States-Japan exercises may be the next to go. Mr. Trump has chafed at the cost of America's deployment in East Asia, and Mr. Kim led him right where he wanted to go. The only thing that may actually be dismantled is the architecture of America's longstanding military alliance with Japan and South Korea.

That serves broader Chinese strategic interests in the region. With the United States pulling back from its alliances, China moves closer to being the dominant power in northeast Asia.

The small but significant silver lining is that the United States and North Korea are no longer trading threats of pre-emptive strikes and nuclear war. Mr. Trump's top-down negotiations could

lead to a stable deterrence relationship between the two countries. But they remain separated by divergent interests and mutual distrust.

The Singapore summit meeting also generates significant risks outside of the relationship between the United States and North Korea. Mr. Kim showed the world that it is possible to leave the Treaty on the Non-Proliferation of Nuclear Weapons, develop nuclear weapons and win a summit meeting with the president of the United States. The lesson for states like Iran is simple: Acquire a thermonuclear ICBM that can threaten America and you too can have your Singapore declaration — a fast track to nuclear status.

This summit meeting — unlike previous moments in United States-North Korea history — was Mr. Kim's moment to come out as the world's ninth current nuclear power.

<https://www.nytimes.com/2018/06/12/opinion/trump-kim-summit-denuclearization-north-korea.html>

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Forbes (New York, N.Y.)

White House Preparing Bio-Defense Strategy As Germ Warfare Fears Rise

By Loren Thompson

June 7, 2018

The National Security Strategy released by the Trump Administration in December makes deterring and/or defeating "weapons of mass destruction" a top priority for U.S. policymakers. In the past, that phrase has almost always been used as a euphemism for nuclear weapons. But in a break with tradition, the administration is putting increased emphasis on combating bio-threats and pandemics. In fact, the National Security Council staff is preparing a dedicated bio-defense strategy.

Bio-threats originate in microscopic organisms -- bacteria, viruses, fungi -- that cause diseases such as influenza, smallpox and anthrax. Highly transmissible, often lethal pathogens have ravaged humanity since homo sapiens first emerged in Africa. Smallpox alone killed more people than all the wars of the 20th Century combined. The Spanish Flu epidemic of 1918 infected a quarter of the world's population, killed 50-100 million, and depressed life expectancy in the U.S. by a dozen years.

Until recently, all of these outbreaks occurred spontaneously in nature as what were once called "germs" evolved to exhibit novel features -- features against which most people had little or no resistance. But now a new danger is looming, as breakthroughs in the life sciences enable scientists to engineer lethal pathogens in their laboratories. One group of Canadian researchers figured out how to synthesize a virus similar to smallpox -- and then published an article explaining how they did it.

The Trump Administration apparently has concluded this is a catastrophe waiting to happen. Virulent pathogens might escape labs to spread globally, killing millions. Worse, they might be exploited by nihilistic extremists to undermine the international order. Various terrorist groups are thought to have sought out scientists who could help them implement such a strategy. The technology and skills needed to synthesize novel pathogens are increasingly available in global commerce, and largely unregulated.

There is no point in trying to stuff this genie back into its bottle. Too many people around the world now know how to manipulate genetic material with great precision. And even if they didn't, there is

a very high likelihood that naturally occurring scourges such as the Spanish Flu will appear again. One scientist at a highly respected research institution told me that humanity is two mutations of the influenza virus away from species extinction. So the Trump Administration has decided it needs to be prepared.

This could be the single most important policy initiative President Trump undertakes, given the potential consequences of a devastating pandemic. It does not require a great deal of additional federal funding, but it does need some sort of mechanism to coordinate all the federal players. The most important player at present is the Assistant Secretary of Health and Human Services for Preparedness & Response, who works with the Centers for Disease Control and others to maintain adequate stockpiles of medical countermeasures.

But a comprehensive bio-defense strategy would require participation by many other players, from the Department of Homeland Security to the Federal Emergency Management Agency to the National Guard. It also requires somebody with presidential authority to set priorities. For instance, the Department of Homeland Security last year proposed defunding the government's only bio-defense analysis and countermeasures lab -- a very untimely move. Someone in the White House needs to be enforcing preparedness priorities.

Beyond that, biological threats need to be removed from the catchall category of "weapons of mass destruction," and addressed according to their unique characteristics. As long as the same officials who are responsible for dealing with chemical or radiological threats also oversee bio-war preparedness, the danger is likely to be neglected. Bio-threats aren't like nerve gas or radiation -- they are living organisms that evolve and may grow worse over time rather than dissipating after their initial impact.

Although the prospect of lethal pandemics in the near future is profoundly unsettling, it is good news that the Trump Administration has recognized the threat and is drafting a response strategy. A bipartisan commission on bio-threats complained that the Obama Administration was not doing enough to prepare for the arrival of new pathogens, whether they originated naturally or were contrived by scientists. Perhaps the Trump Administration can fix this defect in our nation's security posture.

<https://www.forbes.com/sites/lorenthompson/2018/06/07/white-house-preparing-bio-defense-strategy-as-germ-warfare-fears-rise/>

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

To Reassure U.S. Allies in Asia, Admit Mutual Vulnerability with China

By Hugh White

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America does not admit that it is vulnerable to China's strategic nuclear forces. That's the clear message of the 2018 Nuclear Posture Review. While the review was the subject of a voluminous body of commentary and analysis, little of it focused on this particular aspect. Perhaps no one was surprised because it was not new — after all, no previous U.S. strategy document has acknowledged mutual vulnerability with China.

But what is new in this Nuclear Posture Review, and in the National Security Strategy and National Defense Strategy documents that preceded it, is the forthright identification of China as a major strategic rival and military threat. While questions have been raised before about the failure to

acknowledge mutual nuclear vulnerability, this new context makes the issue much more important. The omission raises questions that go right to the heart of America's strategic contest with China in Asia and risks fatally undermining the credibility of U.S. strategic commitments there.

Cold War Lessons

The only other time America and another country have been mutually vulnerable to one another's nuclear forces was during the Cold War. Once the United States and the Soviet Union could target one another's cities, the mutual acknowledgment, acceptance, and maintenance of their shared vulnerability came to be seen as important — even essential — to maintaining strategic stability between the two superpowers. Mutual vulnerability makes each side more confident that the other will not start a war, because both acknowledge that the costs of such a war to their own side would be devastating.

Of course, both sides did what they could to limit their vulnerability by minimizing the damage they would suffer in an all-out nuclear exchange, including through counterforce targeting and damage limitation measures. But they both clearly understood that trying to limit their vulnerability was very different from trying to eliminate it, and they accepted they still faced an inescapable risk of catastrophic damage on an unprecedented scale.

This is still true in relation to Russia, as the new Nuclear Posture Review makes clear, though the document is less clear on mutual vulnerability with Russia than past reviews. This is why Moscow's talk of "escalate to de-escalate" needn't be taken too seriously, except as a way of reminding Washington of the risk that any conventional war could turn into a nuclear one.

Importantly, however, acknowledging mutual vulnerability did not prevent Moscow and Washington from convincing one another that they were resolved to fight a nuclear war if necessary to defend their vital interests. The Cold War stayed cold in large part because both sides were convinced that the other side would fight a nuclear war to preserve the status quo between them, regardless of the cost. The simultaneous acknowledgment of vulnerability and willingness to fight a nuclear war was essential to reassuring allies that they could depend on Washington. Allies knew America could not defend them from the Soviets without running a very high risk of a nuclear war that could devastate U.S. cities. They had to be convinced that America would indeed be willing to accept that risk on their behalf. This could never be taken for granted, of course, but in the end, and for many decades, they were convinced of America's commitment.

America's success in convincing both the Soviets and its allies alike that, despite the awful implications of mutual vulnerability, it was willing to fight a nuclear war, was central to keeping the peace, sustaining its alliances, and deterring any serious Soviet challenge to the status quo. And central to that was Washington's frank and open avowal of the costs it would face if war came. By acknowledging mutual vulnerability, America showed explicitly that it recognized the immense risks of defending its allies and was willing to accept them.

Asian Implications

What does this mean for the Nuclear Posture Review and China? It is important first to establish that America and China are indeed mutually vulnerable to one another's strategic nuclear forces. Both can inflict immense, unprecedented damage on the other.

This has not always been accepted on the American side. This is partly because their nuclear arsenals are so different. China's is far smaller, of course. But, more importantly perhaps, it was not designed for the nuclear warfighting campaigns that drove the development of Soviet and U.S. forces in the Cold War, but rather simply as a minimum deterrent. This may have made it hard to take China seriously as a nuclear adversary.

For that reason, a strand of thinking in U.S. nuclear strategy circles has long held that America could and should seek nuclear primacy over China. The idea is that America could convince China that its nuclear arsenal could be effectively disarmed through U.S. conventional or nuclear preemptive strikes, along with missile defenses to deal with any Chinese missiles that survived those strikes.

But this scenario seems very unlikely indeed. U.S. decision makers could not be sufficiently confident that enough of China's capacity to hit American targets would be eliminated. That is especially true because it would seem relatively easy for China to counter improvements in U.S. offensive and defensive capability by expanding and improving its own offensive forces — as it would surely have both the means and the resolve to do.

The most optimistic assessment would give America a decent chance of eliminating China's offensive forces, and that is unlikely to be good enough. The residual threat of successful Chinese nuclear attacks even on just one or two cities would be unacceptable in any but the most extreme circumstances.

Asymmetries

While debates about the possibility of disarming China will no doubt continue, it seems quixotic to imagine that this option provides a credible basis for U.S. policy towards Beijing. Nor does it seem credible that key audiences outside America — in particular its rivals and allies in Asia — would be convinced otherwise. Hence for all practical purposes we should conclude that the two rivals are mutually vulnerable and will remain so for the foreseeable future.

Of course, they are not equally vulnerable. America's strategic nuclear forces are far bigger than China's and could do a lot more damage to China than the other way around. But does it make much difference if China, with its modest forces, can nonetheless inflict unprecedented destruction and disruption on the United States? The question facing American decision-makers in a crisis with China would be whether the U.S. interests at stake were important enough to justify risking the devastation that America would suffer in a nuclear war. That decision is not much affected by whether China would suffer far worse.

For example, any president facing a decision about whether to start a war with China over Taiwan — which could clearly go nuclear — would need to ask whether the U.S. interests involved justified a significant risk that, say, half a million Americans might die. The fact that ten times that many Chinese could die would not detract from the cost that America would bear if the worst happened. Mutual vulnerability, however unequal, still plays a role in deterring a nuclear war.

Of course, the asymmetry in vulnerability could significantly affect how a crisis unfolded, and the probability that it would end in a nuclear exchange, because it could tip the balance of resolve in Washington's favor. Thus, China might be less willing to accept the danger of nuclear war, and thus more likely to back off from a confrontation, because it risks greater losses. That would give Washington a vital edge in crisis-management gamesmanship, making an armed clash and subsequent escalation to nuclear war less likely.

But that analysis assumes the two sides are equally committed to prevailing, and hence equally ready to accept the costs and risks of doing so. This is almost certainly not the case in the contest between America and China over strategic primacy in East Asia. Intuitively, for reasons of sheer geography, China cares more about East Asia than America does, and might well be more willing to accept 5 million dead than America would be to accept one-tenth that number.

The Art of Commitment

Failing to acknowledge the reality of U.S. vulnerability undermines the credibility of America's commitment to supporting its East Asian allies, and more broadly, to maintaining America's

strategic position in Asia. It deprives Washington of the opportunity to argue that it is committed to defending its allies and to its role in Asia even if this means incurring the risk of nuclear attack on America itself.

That is a major mistake. China's strategic nuclear forces means that U.S. commitments vis-a-vis China can only be credible if adversaries and allies alike believe that America is willing to fight a nuclear war to fulfill them. Like in the Cold War, mutual vulnerability means that only commitments that pass this test can reassure allies and deter adversaries. To sustain its place in Asia, America must convince both audiences that it is willing to endure attacks on its homeland.

It appears the authors of the Nuclear Posture Review may have turned this argument on its head. They perhaps thought that acknowledging U.S. vulnerability to Chinese nuclear attack would undermine the credibility of its commitments in Asia because allies like Japan and South Korea would not believe America was willing to defend them at risk of direct nuclear attack on itself. Per this logic, acknowledging the risk of such an attack would undermine the allies' confidence in guarantees.

Certainly, that's a widespread view from the Asian side of the Pacific, and it would not be surprising if allies like Japan for that reason eagerly urged the drafters of the review not to acknowledge mutual vulnerability. But that is just whistling past the graveyard when mutual vulnerability is so evidently a reality.

In the face of that reality, American commitments can only be made credible to rivals and allies alike with clear and compelling arguments that the United States will uphold these commitments despite the risk of nuclear attack. Those arguments cannot be presented when Washington refuses to acknowledge that risk. On the contrary, by refusing to acknowledge its vulnerability, the United States reinforces the impression that it is not willing to accept these risks. That undermines America's alliances. Even more importantly, it emboldens its adversaries.

This matters enormously to the future of America's strategic engagement in Asia. Recent U.S. strategy documents and policies — including President Barack Obama's pivot to Asia — have increasingly identified China as a strategic competitor. But the Trump administration has broken new ground in acknowledging China as a classic great power rival. The scale and intensity of the strategic contest, and the significance of nuclear threats to that contest, have only now become apparent.

The clear identification of China as a strategic rival and military threat is an important if long overdue step. But the Nuclear Posture Review's failure to acknowledge American vulnerability to China's nuclear forces raises real doubts about America's resolve in confronting China's ambitions in Asia. And that matters because, as I have argued elsewhere, the question of U.S. resolve has become the key issue in its contest with China. Moreover, this failure is destabilizing, because it will only encourage those in Beijing who would argue that China's capacity to hit the United States means Washington can be deterred from resisting Chinese assertiveness or aggression in Asia.

China poses a very serious challenge indeed to American leadership in Asia today. To respond effectively, Washington must do more than identify the problem. It must produce a credible plan to respond to China, with a realistic assessment of the costs and risks involved and clear evidence that those costs and risks are understood and accepted by U.S. political leaders and by the electorate. This must include a frank assessment of the nuclear risks, which is why the Nuclear Posture Review was a big missed opportunity. And time is not on America's side.

<https://warontherocks.com/2018/06/to-reassure-u-s-allies-in-asia-admit-mutual-vulnerability-with-china/>

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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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