



UNITED STATES AIR FORCE
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Feature Report

“Managing Nuclear Modernization Challenges for the U.S. Air Force: A Mission-Centric Approach”. Published by RAND Corporation; October 29, 2019

https://www.rand.org/pubs/research_reports/RR3178.html

“After decades of near neglect, the Air Force is embarking on a vast modernization of its portion of the nation's nuclear deterrence capabilities — but these modernization activities face a range of challenges. Nuclear-specific tasks related to testing and certification have not been performed at scale for many decades and will need to be relearned and revised for the current conditions. The sheer scale of the programs is daunting. And this ambitious set of programs will be fielded by Air Force Global Strike Command (AFGSC), a relatively young command with a relatively small staff that has limited experience in fielding new systems.

“This report identifies and describes means to allay these challenges. The authors focus on the integrated planning and preparation for mission success across individual programs, with a special emphasis on the challenges of operational testing and nuclear certification.”

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NUCLEAR WEAPONS

National Defense (Arlington, Va.)

Air Force Leader Shares Details on B-21 Bomber

By Mandy Mayfield

Oct. 24, 2019

The Air Force's secretive B-21 Raider bomber effort is making progress as prime contractor Northrop Grumman builds the program's first test jet at its Palmdale, California, facility, said one official Oct. 24.

"Today we do have an airplane in there that would be our test jet number one," said Randall Walden, director and program executive officer for the Air Force's Rapid Capabilities Office, which is spearheading the program. "I won't go into a lot of detail [on] how far along we are, but suffice it to say, ... we're working the production line literally today."

Walden noted that "big parts" are currently being manufactured at the facility, but did not disclose which specific components are being built.

The date for the aircraft's projected first flight is still up in the air, Walden said during a breakfast hosted by the Air Force Association in Washington, D.C. The earliest flight date could take place in December 2021. However, he said he would not bet on it.

"Things like large components coming together, integration, ground tests — all the things that lead up to a first flight — have to be accomplished," he said. "There's a lot of things that have to happen between now and a couple of years, ... but in general terms, that's what we're shooting for."

The B-21 is a complex airplane, so it will take time to get all the parts and subsystems into place, he added.

The Air Force plans to hold a public event next year to roll out the B-21 prior to its first flight, Walden said.

In hopes of keeping the bomber on its current schedule trajectory, the service is focused on maintaining the aircraft's major design plans, Walden said.

"Requirements is probably the number one thing — if you don't have stable requirements, that's going to drive a lot of" delays, he said. "In fact, the chief of staff of the Air Force is the only guy who changes the requirements on the model."

The Air Force plans to purchase at least 100 new stealth bombers, which will be capable of carrying nuclear or conventional weapons.

Earlier this year, Gen. Stephen "Seve" Wilson, the Air Force's vice chief of staff, said a critical design review for the program was conducted earlier this year and the service was working on software integration.

— Additional reporting by Connie Lee

<https://www.nationaldefensemagazine.org/articles/2019/10/24/air-force-leader-shares-details-on-b21-bomber>

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Defense One (Washington, D.C.)

\$85B Nuclear Missile Competition Gets Messier as Feds Investigate Northrop

By Marcus Weisgerber

Oct. 25, 2019

The Pentagon's effort to build a new ICBM just took another step toward a no-competition sole-source award — and the prospective lone bidder just came under federal investigation for anti-competitive behavior.

Two pieces of news broke late this week concerning the U.S. Air Force's Ground Based Strategic Deterrent program, whose total value has been estimated at \$85 billion. First, the service stopped paying Boeing for ICBM-related technology-development work that began in 2017. In response, the company has begun to break up the specialized team of engineers it brought together to create a replacement for the Cold War-era Minuteman III, according to a Boeing source close to the project.

Second, a Northrop Grumman filing revealed that the Federal Trade Commission is looking into allegations that the company is not abiding by an agreement that allowed its 2018 acquisition of Orbital ATK, one of just two U.S. makers of solid rocket motors. Those terms required the company to sell rocket motors "on a non-discriminatory basis to all competitors for missile contracts."

Until July, Boeing and Northrop had both been planning to bid on the ICBM contract. Then Boeing announced that it would withdraw, charging that it had been unfairly handicapped in the competition because Northrop had slow-rolled an agreement that would have paved the way for Boeing to buy rocket motors from Orbital ATK.

"One of the factors in Boeing's decision not to bid for the U.S. Air Force's Ground based Strategic Deterrent program was our concern about Northrop Grumman's compliance with a 2018 Federal Trade Commission order that prohibits it from discriminating in the sale of solid rocket motors," Boeing spokesman Todd Blecher said in an emailed statement. "Northrop Grumman has now acknowledged that the FTC is questioning its compliance with that order. We stand ready to support the FTC inquiry."

But Boeing is also moving on from its efforts to build a new ICBM. Employees working on the project are being reassigned to other projects within the company, people close to the project said. Stop-work orders have also been issued to suppliers.

"The program on our side is being unwound," said the Boeing source.

Inquiry into Northrop

The FTC inquiry was revealed on Wednesday in a Northrop Grumman regulatory filing.

"In October 2019, the company received a civil investigative demand from the FTC requesting certain information relating to a potential issue of the company's compliance with the Order in connection with a pending strategic missile competition," the filing states. "The company is working to respond to the request. We believe the company has been and continues to be in full compliance with the Order, but we cannot predict any potential impact on the pending competition."

There's only one publicly known "strategic missile competition" right now: the Air Force's effort to replace the Minuteman III with a new ICBM called the Ground Based Strategic Deterrent.

Northrop CEO Kathy Warden went a bit farther in an earnings call on Thursday, saying, "We do not currently expect any change to the Air Force acquisition strategy as a result of this inquiry."

Air Force leaders have repeatedly refused to discuss the issue, citing a policy not to comment during the bid-solicitation process.

In September, Northrop announced its suppliers for the new ICBM, which includes most of the large U.S. defense contractors, but not Boeing.

Boeing has argued that the government should create a "national team" in which the Air Force chooses the suppliers, not an individual company.

"We are not receiving any pressure to engage in a national team, because I would point out that we do have...what we're calling nationwide team that includes many large and small companies across the country, who are bringing strong capability that will support our GBSD bid," Warden said.

Bids for the new ICBM are due in December.

<https://www.defenseone.com/business/2019/10/usaf-puts-its-icbm-chips-northrop-feds-launch-investigation/160888/?oref=d-river>

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Defense News (Washington, D.C.)

After a Leadership Shakeup at General Dynamics, a Murky Future for Submarine Building

By David B. Larter

Oct. 28, 2019

WASHINGTON — Submarine building, the pride of the U.S. Navy's shipbuilding efforts over the past decade, is facing a mountain of uncertainty, a point underscored by the replacement of senior members of General Dynamics leadership, compounding delays with construction of the Virginia-class submarine and nagging questions about the quality of the work after a high-profile welding issue threatened to trip up the Columbia-class ballistic missile sub program at the starting line.

Adding to the uncertainty for General Dynamics, which operates the Electric Boat shipyard in Connecticut, are indications that profits from constructing Virginia-class subs may be slipping. And challenges in training new workers in the complex world of building subs as well as concerns that the Columbia program might negatively affect General Dynamics' bottom line are impacting General Dynamics' partner yard Huntington Ingalls Industries in Newport News, Virginia, as well as the U.S. Navy.

Furthermore, a contract for the significantly larger Block V Virginia-class submarine, expected to be one of the largest in the Navy's history, has been repeatedly delayed amid disputes over labor rates, sources told Defense News. That contract is more than a year past due, according to Navy budget documents.

In September, General Dynamics pushed out Electric Boat President Jeffrey Geiger. Industry and Navy sources, speaking on the condition of anonymity, said Geiger's replacement was the culmination of mounting frustration on the part of the Navy. That came to a head when quality control issues surfaced with missile tubes in production destined for the Virginia Payload Module, Columbia-class subs and the United Kingdom's replacement ballistic missile sub.

Geiger's ouster came on the heels of General Dynamics replacing long-time executive John Casey as head of the Marine Systems division when he retired earlier this year.

The shakeup, delays and lingering issues put the Navy and the submarine-building enterprise at a crossroads. It's clear that the Navy's efforts to ramp up production of its Virginia-class attack boats

ahead of Columbia have encountered myriad issues and delays. But while delays may be acceptable for the Virginia program, the interconnected nature of submarine building means those delays could eek into a program that the Navy has for years insisted cannot be delayed any further: the replacement of its aging Ohio-class ballistic missile subs, part of the nuclear deterrent triad.

The Navy has said Columbia must be ready for its first patrol in 2031 to ensure the nation doesn't fall below a dangerous threshold where retiring Ohio-class submarines leaving the country without an adequate number of boats to execute its deterrent strategy. But to head that off, the Navy may have reduce its expectations of the industrial base's capacity to build submarines, said Bryan Clark, a senior fellow at the Center for Strategic and Budgetary Assessments think tank and a retired submarine officer.

"The Navy is going to have to reduce its appetite for submarine capacity while it gets the construction process in a better position," he said. "All of the things we have seen in the past year in the submarine-building enterprise are the results of the ramped-up production levels and the challenges that EB [Electric Boat] faces in hiring more workers up in Connecticut.

"They've been growing capacity, investing in infrastructure; they're trying to hire a bunch of workers and design engineers. [But] there just isn't a large workforce of those kinds of people up there as opposed to in Hampton Roads or the Gulf Coast. So there are a lot of challenges in ramping up production to [increase] Virginia-class production and, in addition, starting Columbia and beginning the Virginia Payload Module-equipped Virginias, which is a 30 percent larger submarine."

A bridge to Columbia

In March, Defense News reported that all the Virginia-class submarines under construction were between four and seven months behind schedule. Naval Sea Systems Command pointed to the cumulative effect of ramping up to building two Virginia-class submarines per year. In a statement, the service's top acquisition official said the Navy was continuing to confront material, labor and shipyard infrastructure issues.

Labor issues in particular hit the Newport News yard, which told investors in a recent earnings call that profits had slipped by about 23 percent on the Virginia sub building because of delays associated with labor issues.

In the face of the mounting issues, the Navy should be willing to make difficult choices to get back on an even footing, Clark said.

"Are we going to make some tough choices and dial back submarine construction deliberately to make sure we can get Columbia started correctly?" he asked. "And that means maybe we slow down Virginia, maybe we go to one per year for at least a couple of years to catch up."

Clark said the Navy should continue to fund two submarines per year but should expect that they will take longer to build while General Dynamics and Newport News stabilize their labor and parts issues.

Paring back submarine production is a tough pill to swallow for the Navy, as it's been fighting for years to prevent a shortfall of attack submarines in the coming decade. The Navy expects its inventory of attack boats to drop from 52 to 42 by the late 2020s as Cold War-era Los Angeles-class attack subs retire.

Furthermore, there's the question of whether scaling back production might invite a funding cut, which could make matters worse. The supplier and labor issues, after all, primarily stem from the 1990s when the Navy all but stopped buying submarines, which resulted in a contraction of the

number of businesses that built submarine parts and a loss in skilled laborers who knew how to build them.

Less funding would likely have a detrimental effect on sub-building efforts, said Bill Greenwalt, a former Senate Armed Services Committee staffer.

“Under our current budget and appropriations process, slowing down — which likely implies cutting program funding — would exacerbate industrial base problems as it already has in the past due to lack of program demand,” Greenwalt said. “Congress and the Navy need to be prepared for industrial base surprises and seriously face the past problem of the underfunding of naval shipbuilding.”

“A flexible schedule and more realistic and flexible funding mechanisms will be needed to meet whatever industrial base challenges ... will inevitably arise,” he added. “In the near term we may even need to look at some of our allies’ capabilities to meet shortfalls and help us keep on schedule until we rebuild U.S. capacity.”

Greenwalt’s view tracks with that of General Dynamics, according to a source with knowledge of the company’s thinking on the difficulties it has faced. The company considers ramping up production on the Virginia-class sub as essential to building a sufficient labor force and supplier capacity so the resources are available to build Columbia class on schedule, the source said.

‘Two-hump camel’

The Navy’s top acquisition official, James Geurts, has similarly described the issue. On the possibility of building a third Virginia-class submarine in 2023, Geurts told the House Armed Services Committee’s sea power panel in March that it would benefit the Columbia-building effort.

“We can get some of the additional workforce trained up, get some more of the supplier base and get some of the supplier builds out of the way before Columbia gets here,” he said.

Officials everywhere seem to agree that the labor force is the most critical factor when it comes to getting submarine building on track. In an exit interview with Defense News in August, outgoing Chief of Naval Operations Adm. John Richardson said turnover at shipyards was a challenge but also an exciting chance to build a new generation of skilled labor.

“We’re asking a lot of the submarine industrial base right now to continue with Virginia, two to three per year including that payload module, and deliver Columbia,” Richardson said. “And the workforce is going through a transformation.

“The people who built and delivered the Virginia program, the Los Angeles program and Seawolf — those folks are retiring. We used to have this two-hump camel in terms of the demographics of the shipyard: You had the Cold Warriors and you had the post-9/11 folks. And that Cold War hump is gone. And I think that although it’s going through some friction right now, it’s really inculcating, indoctrinating and educating a brand-new workforce.”

Richardson also sounded a note of warning about work quality, saying that the managers overseeing the work for the submarine-building enterprise must be on top of their jobs.

“We’ve had some welding issues: We’ve got to be on that,” he said. “[It’s] a lot closer oversight as we educate this new team.”

Clarification: The story has been updated to better reflect the arguments surrounding the future of submarine building.

<https://www.defensenews.com/naval/2019/10/28/after-a-leadership-shakeup-at-general-dynamics-a-murky-future-for-submarine-building/>

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Global Biodefense, from DTRA (Seattle, Wash.)

WMD Nonproliferation: A Long-Standing Partnership to Secure “The Polygon”

By Global Biodefense

Oct. 27, 2019

The Semipalatinsk Test Site dates back to the origin of the Soviet Union’s nuclear program. Established in 1947 and referred to as “The Polygon,” the site covers nearly 7,000 square miles of remote steppe in eastern Kazakhstan. Over a 40 year period, the Soviets conducted 456 nuclear explosions at Semipalatinsk, 116 above ground and 340 underground.

The Defense Threat Reduction Agency (DTRA) has been quietly carrying out a collaborative nonproliferation effort at Semipalatinsk Test Site with the government of the Republic of Kazakhstan for more than 26 years.

After the collapse of the Soviet Union in 1991, the nuclear testing not only ceased, but many of the scientists and military personnel abandoned the site and fled the country. They left behind a vast complex of tunnels and boreholes across the test site. Most worrisome, the Soviets left unexpended nuclear materials, completely unsecured, presenting an extreme danger to the public and a significant proliferation risk to the world. The people of the newly-formed Republic of Kazakhstan looked to their new government to solve the problem.

“There was a very strong non-nuclear sentiment in the newly formed country of Kazakhstan at the time,” said Luke Kluchko who was the first project manager from the then Defense Nuclear Agency (DNA), now DTRA, who assisted in helping Kazakhstan recover from the disaster left behind from the Soviets.

“The country’s first president, Nursultan Nazarbayev, immediately declared the site closed. There was a cancelled nuclear test that the Soviets had been preparing which remained in a tunnel for a number of years until they could figure out what to do with it,” Kluchko said.

To properly eliminate the workings of the test site, Kazakhstan created the National Nuclear Center (NNC) on May 15, 1993. The current General Director for the NNC, Erlan Gadletovich Batyrbekov, said that after the closing of the test site, a new set of issues came up that needed to be resolved by their government.

“It was necessary to eliminate the infrastructure of nuclear weapons testing,” Batyrbekov said. “It was necessary to resolve the issues associated with eliminating the consequences of testing such weapons. There was much concern about how to accomplish this large and serious task.”

In the summer of 1994, Kluchko represented the DNA as part of a U.S. interagency expedition to the test site that spent six weeks assessing the Degelen Mountain area of the Semipalatinsk Test Site. After the Partial Nuclear Test Ban Treaty was signed in 1963, and test detonations of nuclear weapons in the atmosphere, outer space and underwater became prohibited, the Soviets used the Degelen Mountain site for 186 of the 340 underground nuclear tests conducted at Semipalatinsk.

“As a group, we were able to suggest to the NNC leadership that it would be in everyone’s best interest to quickly and safely seal the nuclear test tunnels,” Kluchko said. “All whose portals were wide open, 181 of them,” he said.

Shortly thereafter, the Republic of Kazakhstan sent an official request to United States Secretary of Defense William Perry to consider providing assistance to safely eliminate its infrastructure of

nuclear testing. The assistance would come from the Nunn-Lugar Cooperative Threat Reduction (CTR) program, which would be absorbed into DTRA in 1998.

“The project started in earnest,” said Kluchko. “Within a year we destroyed the first tunnel and did about 60 tunnels per year. Essentially within 36 months, we were able to complete the infrastructure elimination process,” he said.

Batyrbekov said that as of today, the entire infrastructure has been rendered safe.

“The infrastructure has been put in a state which will not allow it to be used again for the purposes for which it was created,” he proudly stated. “But after the elimination of the infrastructure, there were other goals, specifically the elimination of the consequences of nuclear testing,” he said.

“This kind of work is being continued to eliminate focal points where there is sensitive information in terms of nonproliferation,” he said. “All of this needs to be eliminated and that is exactly what we are doing with DTRA’s Cooperative Threat Reduction program.”

Several years after the initial Degelen Mountain project concluded, the NNC started a program to comprehensively evaluate the entire Semipalatinsk Test Site for radiological concerns. They worked their way from the north side of the site to the south side and saw there were areas where nuclear material was still present, and in some cases, in concentrations that would be considered a proliferation risk.

DTRA once again partnered with the NNC to eliminate the remaining risk. In 2013 the two agencies agreed to conduct a full, systematic survey of the Experimental Field where the earliest nuclear tests took place, and concluded there was still work to be done.

“Initially, material left behind from some of the atmospheric or surface tests remained evenly dispersed on the surface,” said Mark Gibson, current program manager for DTRA activities at the Semipalatinsk Test Site. “In some cases, we could dig up these concentrations and take to secure storage off-site. In other cases where it was less concentrated, we’d plow the areas and further dilute it so it would be less easily detectable for someone looking.”

Batyrbekov praised the work done by the NNC alongside DTRA.

“DTRA is probably one of our biggest partners in the entire history of the National Nuclear Center, not only in terms of the financial support we receive, but also in terms of the significance of the projects that we implemented,” he said. “The elimination of infrastructure – the scope of this work is very serious.”

Batyrbekov said his team continues to conduct a realistic radiological assessment of the territory at the Semipalatinsk Test Site today, and are more than 70 percent complete with the goal of surveying the entire territory by 2021.

Gibson said the partnership between the NNC was built on the likes of his predecessors, like Kluchko, and continues to remain rock solid through today.

“It’s important for us to maintain a relationship with the NNC and the Government of Kazakhstan,” Gibson said. “I’ve grown used to saying the proliferation risk has been greatly reduced here, but it will never be zero; that’s just the reality of a former nuclear test site.”

“I give a lot of credit to Kazakhstan for embracing a nonproliferation regime in circumstances that were not ideal for them,” said Gibson. “I think our work at the Experimental Field has been an extension of making the world a safer place.”

Source: DTRA, edited for context and format by Global Biodefense.

<https://globalbiodefense.com/2019/10/27/wmd-nonproliferation-a-long-standing-partnership-to-secure-the-polygon/>

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Breaking Defense (Washington, D.C.)

F-35A, B-21 Buys Must Continue, But Where's the \$\$, Says CSIS

By Theresa Hitchens

Oct. 29, 2019

WASHINGTON: The central question not answered in three new congressionally mandated studies on future Air Force force structure is how to ensure affordability, finds a review by the Center for Strategic and International Studies (CSIS). While the three more or less agree on the overall numbers of fighters and bombers needed in the 2030 force, and that both the B-21 bomber and the F-35A programs should be continued or even accelerated, none of them directly assess how much it will all cost, CSIS says.

In fact, the Air Force's study is quite clear that it did not factor cost into its analysis, nor did it assume any new technologies coming on line in the 2030 force, explains Todd Harrison, director of CSIS's Aerospace Security Project. "If you constrain yourself so that you can't have new capabilities, and you're fiscally unconstrained, you wind up with a trivial solution: which is just buy more of all the things we're already buying."

Harrison explained that the biggest problem for the Air Force right now is growing costs despite a dwindling fleet and sub-optimal mission readiness rates. The current Air Force situation is "like a power-on stall in an airplane," he said. Despite the budget being "full throttle" and "at an all time high," the service has fewer aircraft and personnel, a declining mission capable rate, it flies fewer hours per year, and is suffering a higher mishap rate.

According to the CSIS review, the key cost driver is the rising price of operating aircraft — not, as one might assume, due to the increasing age of the fleet or even due to a higher operational tempo (which is actually lower than it was a few years back). Instead, Harrison said, the high costs are caused primarily by maintaining "so many small fleets" of different sorts of aircraft for highly specific missions, such as the B-2 bomber and the RC-135 reconnaissance aircraft. "When you have a large fleet, the cost per plane goes down; for small fleets, the cost per plane goes way up," he explained. "That's because you have huge fixed costs with each of your aircraft. ... Operating costs of planes is going to be determined by how many you keep in the inventory."

This is borne out by the three studies, according to CSIS's review, all of which find that the Air Force should move from "single-mission, platform-centric systems" towards "multi-mission, payload-centric systems." An example, according to CSIS, is that all three "implicitly or explicitly" endorse moving away from the E-8 JSTARS battle management aircraft to a multi-domain solution that can "leverage other existing platforms where possible."

Another area where consolidation should be considered is in tankers, Harrison noted. This is also an area where the Air Force might want to consider the potential use of remotely piloted aircraft (RPA), he said. Currently, drones have the highest mission capable rates, are doing the most flying, and cost the least. So looking at them for other missions besides intelligence, surveillance and reconnaissance (ISR) — the bulk of what they do now — and dropping bombs makes sense, Harrison concluded.

The three studies were mandated by Section 1064 of the 2018 National Defense Authorization Act (NDAA), and were undertaken by the Air Force, Mitre Corporation and the Center for Strategic and Budgetary Assessments (CSBA). Harrison said Congress wanted to see a public assessment of how the Air Force's current wishlist — embodied in the September 2018 "Air Force We Need" study calling for 386 operational squadrons up from the current 312 — might or might not be justified. The NDAA language was modeled on a similar study Congress mandated for the Navy in the 2016 NDAA, he noted.

Of the three, Harrison said, the 158-page CSBA study "comes the closest" to answering the congressional call. The other two, however, "are incomplete" because they fail to show their work in an unclassified form, he said. "Congress wanted it out in the open," he explained.

On the other hand, he said, it is important to recognize that despite different assumptions going in, the three studies are remarkably consistent on a number of key issues. These areas of consensus, he said, preview where future Air Force decisions on force structure mix and budget requirements are likely to go.

The CSIS review found that the studies agreed on the fact that the pivot to great power competition with Russia and China means that the Air Force needs more long-range, long-loiter platforms: bombers, remotely piloted aircraft (RPA), tankers and even bases to support long-range action. The studies also agree that the increased threat environment means the future force must be more survivable.

The studies say the 2030 force should include between some 2000 fighter jets: MITRE says 2633, CSBA says 2198, and the Air Force called for 2294. This includes 762 F-35A jets recommended by MITRE and 911 recommended by CSBA. The Air Force did not give specific numbers of aircraft in its study, Harrison explained, rather he extrapolated the totals by type of plane from its count of squadrons.

As for the number of bombers needed by 2030, MITRE recommended 195 total, with 38 B-21s; CSBA recommended 192, with 55 B-21s; and the Air Force study recommended a total of 238.

<https://breakingdefense.com/2019/10/f-35a-b-21-buys-must-continue-but-where-says-csis/>

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US COUNTER-WMD

Global Biodefense (Seattle, Wash.)

Early Diagnostic Imaging of Sulfur Mustard Poisoning

By Global Biodefense

Oct. 27, 2019

Sulfur mustard is one of the most harmful chemical warfare agents and can induce skin, eye, and lung injuries. Detecting intact sulfur mustard in vivo might be an effective approach for the early diagnosis, accelerating treatment and therefore improving outcomes.

In a new study published in ACS Sensors, researchers developed a series of near-infrared fluorescent probes to selectively interact with intact sulfur mustard.

Among these probes, SiNIR-SM exhibited an extremely good response rate and a high off/on contrast. Both SiNIR-SM and OxSM-1 were successfully applied to image sulfur mustard in living

cells. Using SiNIR-SM, the researchers found that sulfur mustard accumulates in the mitochondria of living cells.

SiNIR-SM probes were found suitable for the early diagnostic imaging of sulfur mustard poisoning in SKH-1 mice via the detection of intact sulfur mustard.

The study results could provide a new insight for the treatment of sulfur mustard injuries.

The research team was comprised of scientists from the Lab of Toxicology & Pharmacology, Faculty of Naval Medicine, Second Military Medical University, Shanghai, China; State Key Laboratory of Materials-Oriented Chemical Engineering, College of Biotechnology and Pharmaceutical Engineering, Nanjing Tech University, Nanjing, China; and the Department of Vascular Disease, Shanghai TCM-Integrated Hospital, Shanghai University of Traditional Chinese Medicine, Shanghai, China.

Development of a Series of Fluorescent Probes for the Early Diagnostic Imaging of Sulfur Mustard Poisoning. ACS Sensors, 24 Sept. 2019.

<https://globalbiodefense.com/2019/10/27/early-diagnostic-imaging-of-sulfur-mustard-poisoning/>

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US ARMS CONTROL

The Hill (Washington, D.C.)

Nuclear Command Nominee Sidesteps Questions on Arms Control Treaties

By Rebecca Kheel

Oct. 24, 2019

The admiral nominated to lead the U.S. military command in charge of nuclear weapons sidestepped questions Thursday on whether the United States should stay in a pair of treaties arms control advocates fear are on President Trump's chopping block.

Vice Adm. Charles Richard, the nominee to be commander of U.S. Strategic Command, told the Senate Armed Services Committee he would give the president his "best military advice" on the New START Treaty and Open Skies Treaty, and listed several pros and cons with each.

But he would not definitively say at his confirmation hearing whether he supports staying in the treaties or withdrawing despite several senators' attempts to get him to do so.

"I will support any arms control or other treaty that enhances the security of this nation," Richard said generally when asked about both treaties.

New START, negotiated by the Obama administration, caps the number of deployed nuclear warheads the United States and Russia can have at 1,550 each.

New START is up for renewal in 2021. The Trump administration has indicated it wants to expand the scope of the treaty as a condition of extension, by taking steps such as folding in China and other weapons not currently covered by the agreement.

Supporters of New START say the Trump administration's conditions are poison pills meant to kill the treaty.

The Open Skies Treaty, meanwhile, allows the pact's 34 signatories to fly unarmed observation flights over the entire territory of other signatories. The intention is to increase transparency and reduce the risk of military miscalculation.

The United States has also used the treaty in recent years to show support for Ukraine in the face of Russian aggression, flying observation flights in 2018 after Russia seized Ukrainian naval ships and in 2014 after Russia invaded Crimea.

But Republicans for years have accused Russia of violating the treaty by blocking flights over some of its territory, including Kaliningrad and areas near its border with the Georgian regions of South Ossetia and Abkhazia.

Democrats first raised the alarm earlier this month that the administration was considering withdrawing from Open Skies, writing a letter to Defense Secretary Mark Esper and Secretary of State Mike Pompeo that said they "understand" a withdrawal is under consideration.

On Thursday, Sen. Tom Cotton (R-Ark.), an ardent opponent of Open Skies, pushed Richard on his case for withdrawing from the treaty.

Cotton asked Richard whether he sees "value in remaining in a treaty where only one side is following the rules" and whether "we have the best satellite constellation in the world."

"I think this is a lot like the Intermediate-Range Nuclear Forces Treaty," Cotton said, referring to a treaty Trump has already withdrawn from. "Everyone agrees Russia is not complying with it. Everyone agrees it would be best if we brought Russia back into compliance. Everyone agrees it would be great if everyone had a pony, as well. But we've spent years trying to get Russia into compliance with this treaty, and in the meantime, Russia has continued to gain significant intelligence advantage over the United States."

Richard told Cotton his analysis of Russia's violations was "quite correct," but would not commit one way or the other on the treaty.

"You are hitting at the factors that have to be considered on whether or not we stay in the treaty," Richard told Cotton.

Asked later by Sen. Tammy Duckworth (D-Ill.) for risks in withdrawing from the treaty, Richard cited the Open Skies's benefit to U.S. allies.

"The primary negative to that, ma'am, I would put in the category of the assurance of our allies," he said. "We're not the only signatory to that treaty. It provides valuable insight and partnership opportunities with our allies. But it does require us to make the capital and resource investments to fully use the provisions inside that treaty, and it does come at a counterintelligence cost the United States."

On New START, Duckworth and committee ranking member Jack Reed (D-R.I.) pressed Richard on the benefits of the agreement.

Richard said New START has provided "valuable insight" on the makeup of Russia's strategic forces, but raised concerns that the treaty does not cover some types of weapons and appeared to allude to China not being a party to the treaty.

"The New START treaty has provided us with valuable insight into Russian, in this case, capabilities," he said. "It gives us a feel for their size, capacity, capability, but it also doesn't address large categories of weapons that are not treaty constrained. It is only with Russia, and they are developing new systems. And I would provide my best military advice, if confirmed, into the pros and cons of any future agreement, including this one."

<https://thehill.com/policy/defense/467290-nuclear-command-nominee-sidesteps-questions-on-whether-to-stay-in-arms-control>

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VOA (Washington, D.C.)

Swedish Envoy: US, N. Korea Talks Went Longer Than Planned

By William Gallo

Oct. 23, 2019

SEOUL - The recent nuclear negotiations between the United States and North Korea were substantive and lasted longer than anticipated, according to a Swedish diplomat who helped arrange the talks.

The upbeat analysis by Swedish Special Envoy Kent Harstedt stands in contrast to that of North Korean diplomats, who blamed Washington for failing to bring new ideas to the early October talks in Sweden's capital.

At an event Wednesday in Seoul, Harstedt said the U.S.-North Korea negotiations lasted "many hours" and were "not interrupted." He said he was "cautiously optimistic" the talks would continue, despite North Korea not accepting Sweden's invitation for follow-up talks within two weeks.

"The DPRK hasn't closed the door for continuation at this point," Harstedt said, using an abbreviation for North Korea's official name. "We don't comment exactly on our dialogue with DPRK. We can just say we have a very good working dialogue with them."

"We also have to bear in mind that this is a very, very sensitive and complicated matter to discuss," the envoy added.

Sweden has acted as an intermediary between the United States and North Korea, since the two countries do not have official diplomatic relations. Though Sweden helped set up the U.S.-North Korean talks, Harstedt said he was not involved in the negotiations.

Immediately after the Stockholm talks, U.S. officials characterized the discussions as "good" and insisted that they want them to continue. But North Korea said it has no intention to engage in "sickening negotiations" until the United States takes unspecified steps to withdraw its "hostile policy."

"I think it's good that both sides expressed themselves afterwards," Harstedt said.

Since the breakdown of the Stockholm talks, North Korea has hinted at a return to major provocations.

Last week, North Korean state media published photos of leader Kim Jong Un riding a white horse up the country's highest mountain while warning of a "great operation to strike the world with wonder." Similar reports have sometimes preceded major policy shifts.

Pyongyang has also issued a veiled threat it may resume nuclear or long-range missile tests -- a move that would risk upsetting the nuclear talks.

North Korea has not conducted a nuclear or long-range missile test since 2017. In 2018, Kim announced a self-imposed moratorium on such tests.

Since May, Pyongyang has conducted 11 rounds of short- or medium-range missile launches. U.S. President Donald Trump has shrugged off the tests, saying short-range missiles do not threaten the United States.

Some analysts view North Korea's moves as evidence Pyongyang believes it is in a stronger bargaining position, especially amid Trump's domestic political troubles and upcoming re-election campaign.

U.S.-North Korea talks have been stalled since February, when Trump walked away from a summit with Kim in Hanoi, Vietnam. The two sides disagreed on how to pace sanctions relief with steps to dismantle North Korea's nuclear program.

Although Trump has been reluctant to relax sanctions unless North Korea agrees to abandon its entire nuclear weapons program, he had signaled increased flexibility ahead of the Stockholm talks, speaking of the need for a "new method" to the negotiations.

It's not clear what Washington was prepared to offer. One possibility: the United States could allow the resumption of inter-Korean economic initiatives such as the Kaesong Industrial Complex and tours to North Korea's Mount Kumgang resort.

Such concessions could provide North Korea much-needed sources of cash without completely dismantling the sanctions regime that Washington has used to pressure Pyongyang.

On Wednesday, North Korean state media signaled Kim may not be interested in such a concession.

During a visit to Mount Kumgang, Kim slammed dependence on South Korea for the operation of the resort, according to the official Korean Central News Agency.

During his visit, KCNA said Kim would like to tear down the "backward" and "shabby" facilities built by the South. It suggested he may try to reopen the facility, regardless of progress in inter-Korean relations.

Amid a warming of relations in 2018, North and South Korea agreed to "normalize operations" at Mount Kumgang when conditions allow. Inter-Korean relations have since worsened, and international sanctions have prevented the resumption of South Korean tours.

South Korean tours of Mount Kumgang were stopped in 2008 after a North Korean soldier shot and killed a 53-year-old tourist who had allegedly wandered into an off-limits area. Since then, the resort has not seen much activity.

<https://www.voanews.com/usa/swedish-envoy-us-n-korea-talks-went-longer-planned>

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The Hill (Washington, D.C.)

Poll: Majority of Voters Are Deeply Concerned about Iran Obtaining Nuclear Weapons

By The Hill

Oct. 28, 2019

A large majority of voters — 84 percent — are concerned about the prospect of Iran obtaining nuclear weapons, according to a Hill-HarrisX poll released on Monday.

That's more than those who expressed concern over other foreign policy issues, including North Korea's use of ballistic missiles, U.S. election security, Turkey's military action in Syria and President Trump's ongoing trade war with China.

Voters across party lines expressed concern over Iran's nuclear capabilities.

Of those polled, 89 percent of Democratic voters said they were either very or somewhat concerned about the Middle East country developing weapons of mass destruction, compared to 85 percent of Republican and 79 percent of independents who said the same.

Tensions between the U.S. and Iran escalated over the summer after the U.S. military confirmed that Iran shot down a Navy drone. Trump also accused Tehran of being behind attacks on two oil tankers, which prompted the administration to deploy an additional 1,000 troops to the Middle East.

Tehran responded by announcing that it would surpass the limit for uranium enrichment as agreed to in the nuclear deal that was created under the Obama administration. Trump withdrew the U.S. from the deal last year, but Iran had agreed to abide by the agreement's terms until earlier this year.

The Hill-HarrisX poll was conducted online between Oct. 21 and Oct. 22 among 1,001 registered voters. The margin of error for the full sampling is plus or minus 3.1 percentage points.

—Tess Bonn

<https://thehill.com/hilltv/rising/467759-poll-voters-say-iran-is-top-foreign-policy-concern>

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COMMENTARY

Real Clear Politics (Chicago, Illinois)

Missile Defense Needs Trump's Attention

By Rebecca L. Heinrichs

Oct. 25, 2019

When it comes to missile defense during the Trump administration, there is quite a bit of over-promising and under-delivering.

Distracted by impeachment efforts and other political controversies, one wonders if the president even knows. Trump has repeatedly touted his revamping of the U.S. military. While he's right that his administration requested \$34 billion over last year's enacted levels, which included a pay raise for U.S. forces and a much-needed replenishment of things like depleted munitions, one of his most public and repeated commitments -- to leave a legacy of an adapted, modern missile defense system -- has not been realized.

Missiles are the bread and butter of adversary militaries trying to leverage the United States. They are a relatively inexpensive way to hold U.S. interests at risk and U.S. adversaries have been steadily working to improve their arsenals by adding to the number in their inventories and by making them more difficult to detect and intercept. Mitigating the risks in this new missile era requires new thinking and strategies.

So it was encouraging that when the administration published its Missile Defense Review, President Trump wanted to be the one who explained its contents and to emphatically demonstrate that this was his plan.

With soaring rhetoric that called to mind a different Republican president, Trump outlined his administration's plans for defending the nation, our troops and valuable assets, and allies from the growing threat of missiles.

At the Pentagon, flanked by his senior national security deputies, he said, "Our goal is simple: to ensure that we can detect and destroy any missile launched against the United States — anywhere, anytime, anyplace." Perhaps a simple goal, but it's an ambitious one, with bureaucratic and ideological hurdles so high that implementing it will require the constant oversight, commitment, and leadership of the president and his most senior deputies.

The mismatch is clearest in two areas. One, the defense of the U.S. homeland from the kinds of threats North Korea poses. President Trump said:

"We will prioritize the defense of the American people above all else. Our review calls for 20 new ground-based interceptors at Fort Greely, Alaska, and new radars and sensors to immediately detect foreign missiles launched against our great nation. We are committed to establishing a missile defense program that can shield every city in the United States. And we will never negotiate away our right to do this."

Two years after the president first directed the Pentagon to add the 20 new interceptors for the Ground-based Midcourse Defense (GMD) system, they are not in the ground protecting the American people. Giant holes at Fort Greely remain unfilled, a painful metaphor for the president's speech. There are currently 44 interceptors in the ground and on standby to protect the American people, and although the last few tests of the system proved remarkable good capability, adversaries are getting better and making more missiles, and so the system must continually adapt to stay ahead of the threat.

The Pentagon, with the urging of Congress, set out to improve the system's reliability before it added the new interceptors to the inventory. But a technical issue arose having to do with the component of the system that collides with the incoming warhead called the kill vehicle. Pentagon leaders decided to cancel the "redesigned kill vehicle" program, leaving the country without a plan to adapt the current homeland defense interceptors. Compounding the problem, the Obama administration cancelled the production line of the most current kill vehicle, the ones we had intended to replace.

In response, the Pentagon has called for the development of an entirely new interceptor that can handle even more complex threats. This is good, but as it stands, there is no plan to put any kind of kill vehicle on the president's 20 interceptors despite the reality that the threat to American cities from North Korean ICBMs is even more serious today than three years ago.

The Trump document that laid out the new missile defense strategy rightly made the case that missile defense strengthens the hand of diplomats trying to negotiate with U.S. adversaries. As the administration continues to navigate the vexing problem of North Korea's stubborn nuclear missile program, it cannot afford to permit the homeland missile defense system to flail and falter.

Not only did the budget fail to deliver on adapting the homeland missile defense system to protect the homeland against rogue-state ICBMs, it didn't adapt the system to defend against evolving missile threats, including from China and Russia.

But, again, President Trump said the country would do so.

It is not enough to merely keep pace with our adversaries; we must outpace them at every single turn. We must pursue the advanced technology and research to guarantee that the United States is always several steps ahead of those who would do us harm. ... We will protect the American people from all types of missile attacks. In the past, the United States lacked a comprehensive strategy for

missile defense that extended beyond ballistic missiles. Under our plan, that will change. The U.S. will now adjust its posture to also defend against any missile strikes, including cruise and hypersonic missiles.

To provide defense of U.S. bases abroad, and aircraft carriers that project U.S. power in areas where adversaries are contesting American resolve, the United States must have a sensor layer in space. Ground- and sea-based sensors cannot keep a track on missiles that do not follow ballistic trajectories.

The Iranian attack on Saudi oil facilities should serve as a wake-up call. This was an integrated attack using cruise missiles and unmanned aerial systems (UAS) that ballistic missile defense systems are not designed to track and intercept. Iran clearly knows the limitations of the American ballistic missile systems the Saudis have purchased and is adapting its offensive attack. Imagine the damage that China, the country that has tested more missiles in 2018 than the entire world combined, could do to allies, U.S. bases, and assets.

The United States and allies must maintain their ballistic missile defenses, while also adapting strategies and systems to fill in the gaps, and to layer and integrate air and missile defense. To begin to do this, no question, the United States must have a sensor layer that provides persistent tracking from space. The new vice chairman of the Joint Staff, Gen. John Hyten, along with the top science chief, Under Secretary Michael Griffin, and others, have strongly stressed that this is their top priority. Despite their commitment and the president's direction, they were unable to secure support for it from within the bureaucracy. At an event at the Hudson Institute, I asked Griffin about the need to develop and deploy a space tracking layer and asked why the Pentagon budget request to Congress failed to ask for the needed funding. He said:

So the requirement leads you to a proliferated sensor layer in relatively much lower orbit, so that's how we get to that point. So you're completely correct in your question or your opening comment that, at this year's Missile Defense Review, President Trump quite correctly enunciated the need for such a layer, and yet, our budget didn't show it. Well, it can take a little bit of time for the bureaucracy to catch up with the elected leadership [emphasis mine], and I think this year, we're going to be making a stronger try at getting the funding for that space layer into the budget.

The "bureaucracy" is not implementing the explicit mandates of the elected leadership. Unless the president or his most senior deputies focus on the issue, despite other whirling distractions, there is little reason to hope for an improvement in the next -- and last -- budget request to Congress of this term. That would mean that after a single presidential term, the country is no safer from missile attack than it was during the Obama administration, and if one considers the steady improvement of the missile arsenals of our adversaries, we are perhaps more vulnerable.

https://www.realclearpolitics.com/articles/2019/10/25/missile_defense_needs_trumps_attention.html

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Defense News (Washington, D.C.)

South Korea's Missile Detection Failure Shows Need for Cooperation with Japan

By Mathew Ha

Oct. 24, 2019

On Oct. 11, Chong Jong-sup, an opposition member of South Korea's National Assembly, revealed that South Korean naval vessels failed to detect numerous missiles launched from North Korea between May and September. Seoul's failure to detect these launches indicates South Korea's need to reassess not only its ballistic missile defense capabilities, but also its recent decision to terminate an essential bilateral military information-sharing agreement with Japan.

According to Chong, South Korean Navy vessels equipped with the Aegis defense system failed to detect and track North Korean ballistic missile launches on May 4, May 9, July 25, Aug. 2 and Sept. 10. According to the U.S. Congressional Research Service, the Aegis ballistic missile defense system gives vessels the "capability for providing regional defense against short and medium-range ballistic missile attacks." Currently, the U.S., South Korea and Japan all deploy Aegis-equipped destroyers in the Pacific region.

Adm. Sim Seung-seob, South Korea's chief of naval operations, explained that the detection failures occurred because "the missile activities were out of Aegis radar range in some cases." Sim also highlighted the possibility that the Navy failed to update these vessels' combat readiness systems.

The detection failures coincide with a noticeable increase in North Korean ballistic missile testing. Since May 2019, North Korea conducted 12 weapons tests. The most recent missile test involved a submarine-launched ballistic missile that highlighted Pyongyang's attempt to secure a second-strike capability.

North Korea will likely continue conducting periodic missile tests if the regime insists on keeping its nuclear weapons and ballistic missile programs. After the failed talks in Hanoi, Vietnam, and Stockholm, Sweden, these ongoing North Korean tests reaffirm Kim's intent to keep all of his weapons while extracting concessions from the U.S. and its allies with vague promises to disarm.

South Korea must ensure that its ballistic missile defense capabilities reach their full potential to deter and defend against the North Korean threat. Seoul, which currently possesses three Sejong the Great-class KDX III destroyers equipped with the Aegis ballistic missile defense system, plans to increase its Aegis fleet by building three more comparably equipped destroyers by 2028.

While increasing the size of the fleet will help bolster Seoul's defenses, South Korea's Aegis vessels can only exchange targeting data with U.S. vessels, and not with Japanese ones. This is because U.S. and South Korean vessels share a common encryption system, whereas Japanese vessels have a different one. Information sharing would not only enhance ship-to-ship interoperability between the U.S. and South Korea but also ensure the Aegis ballistic missile defense system has a robust capability to defend against North Korean missiles.

In 2016, Tokyo and Seoul sought to overcome this hurdle with a workaround, signing the bilateral military intelligence sharing agreement known as the General Security of Military Information Agreement, or GSOMIA. Japan's Ministry of Defense described the GSOMIA "as a framework for protecting various confidential information including information regarding North Korea's nuclear and missile threat."

This pact enabled South Korea and Japan to relay information about North Korean missiles that their Aegis vessels could not share with one another. Unfortunately, Seoul announced in August that it would not renew GSOMIA amid the two nations' ongoing trade dispute. Despite its focus on

economics, this dispute reflects South Korea's deep-seated grievances that stem from imperial Japan's role as a colonial power on the peninsula.

Fortunately, despite the complex roots of Tokyo and Seoul's persistent strife, South Korea continues to respect GSOMIA, at least pending its expiration on Nov. 22. Under GSOMIA, South Korea earlier this month shared with Japan its assessment of North Korea's submarine-launched ballistic missile, helping Japan correct its mistaken evaluation that Pyongyang launched two short-range missiles, rather than a single sub-launched ballistic missile that can strike more extended-range targets.

This case illustrates how intelligence sharing could help Japan and South Korea construct a more comprehensive understanding of the threat from Pyongyang.

Seoul's political leadership should therefore reconsider its decision not to renew GSOMIA. Bilateral exchange of military intelligence is essential for the two countries to have common situational awareness. Washington's allies can also take their cooperation a step further by adopting a common encryption system for Korean and Japanese Aegis vessels, enabling their vessels to communicate targeting data in live wartime scenarios in order to boost overall ship-to-ship interoperability.

Overall, resolving South Korea and Japan's historic tensions will take time and require bold leadership from Seoul and Tokyo. However, Pyongyang's drive to perfect its ballistic missiles should remind America's two Asian allies that deepening security cooperation will enhance readiness and bolster deterrence against a common threat.

Mathew Ha is a research associate focused on North Korea at the Foundation for Defense of Democracies, where he also contributes to FDD's Center on Military and Political Power.

<https://www.defensenews.com/opinion/commentary/2019/10/24/south-koreas-missile-detection-failure-shows-need-for-cooperation-with-japan/>

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Bulletin of the Atomic Scientists (Chicago, Illinois)

Impeachment Backstory: The Nuclear Dimension of US Security Assistance to Ukraine

By Mariana Budjeryn

Oct. 29, 2019

Ukraine has burst into international headlines as the country at the heart of the impeachment investigation of US President Donald Trump. Earlier this year, President Trump halted nearly \$400 million of military aid to Ukraine, which has been battling Russian aggression for over five years at the cost of 13,000 lives. This move might have been used by Trump as leverage to pressure Ukrainian leadership to assist him in undermining his political rival, former Vice President Joe Biden, an allegation the impeachment investigation is set to establish.

In response, Trump retorted that the military aid to Ukraine had been withheld in order to get European countries to step up, because the United States is the only one paying in. That claim has been fact-checked (here, here, and here) and proven wrong. Yet many Americans, for whom Ukraine remains a faraway country about which they know little, may wonder why their tax dollars should be spent on security assistance to this country in the first place.

In fact, there is a very good reason for doing so, with or without the involvement of the Europeans, that Mr. Trump and the American public ought to know. It's called the Budapest Memorandum, or formally the Memorandum on Security Assurances in Connection with Ukraine's Accession to the

Treaty on the Nonproliferation of Nuclear Weapons. By making its end of the bargain enshrined in the Budapest Memorandum contingent on the president's whims, the United States is weakening the nonproliferation regime.

The Budapest Memorandum. Concluded in Budapest on December 5, 1994, the memorandum was part of the deal under which Ukraine agreed to surrender the world's third-largest nuclear arsenal. When the Soviet Union collapsed in 1991, Ukraine inherited more nuclear weapons than China, France, and the United Kingdom combined: 176 intercontinental ballistic missiles and 44 strategic bombers capable of delivering over 2,000 nuclear warheads, as well as over 2,800 tactical nuclear weapons. While Moscow still retained operational control over strategic nuclear weapons, Ukraine also inherited a scientific and military-industrial capacity that would have allowed it to become a fully-fledged nuclear weapons state in a relatively short time.

Ukraine chose to surrender nuclear arms for a number of reasons, not least of which was its desire to be an international citizen in good standing. In return, however, it wanted its security concerns addressed. In particular, Ukraine was wary of Russia, which even under the quasi-democratic leadership of Boris Yeltsin remained reluctant to accept Ukraine's independent statehood and borders.

Crimea quickly became a problem. An arid peninsula geographically attached to mainland Ukraine, ethnically cleansed of its indigenous Tatar population in 1944 by Josef Stalin, and repopulated with Russians and Ukrainians, Crimea was administratively incorporated into Soviet Ukraine in 1954 by Nikita Khrushchev for political and economic reasons. After the Soviet dissolution, Russia fueled political irredentism in Crimea and, in July 1993, the Russian legislature claimed Russian sovereignty over the Crimean city of Sevastopol, the base of the Soviet Black Sea fleet.

Crimea would remain the Achilles heel of Ukraine's territorial integrity and a lever of Russian influence. Ukrainian leaders understood that and negotiated hard for security guarantees from all the nuclear powers, although what they essentially wanted was US protection against a potential Russian threat. But the United States was unwilling to extend to Ukraine the kind of security guarantees it extended to its NATO allies, nor would the Clinton administration agree to commit to a legally-binding international treaty because it wanted to avoid dealing with ratification by Congress.

The compromise was a political document, the Budapest Memorandum, in which the United States, the United Kingdom, and Russia, the three depository states of the Nuclear Non-proliferation Treaty (NPT), pledged to respect Ukraine's territorial integrity and the inviolability of its borders, abstain from economic coercion, and refrain from the threat or use of force—nuclear or otherwise. The memorandum did not specify the assistance Ukraine was to receive if it became a victim of aggression. Ukrainians, however, were led to believe that US would uphold its commitments to their security in the time of need, as Ukraine upheld its commitment to nuclear nonproliferation norms.

The breach. Russia glibly violated the Budapest Memorandum—and a score of other international norms, including legally-binding ones—when it annexed Crimea and invaded Ukraine's eastern province of Donbas in 2014. The United States then faced a situation in which the check it wrote in 1994 came due. The incumbent Obama administration was more forceful in words than in deeds. It kicked Russia out of the G8, slapped it with some sanctions, and mobilized its European allies to do the same. Obama was reluctant, however, to provide meaningful military assistance to Ukraine, including the release of lethal defensive arms such as the Javelin anti-tank missiles authorized by Congress in 2015, for the fear of escalating the conflict.

To its credit, upon assuming the reins in early 2017, the Trump administration supplied the Javelins and stepped up other security assistance to Ukraine, although by that time the conflict had receded to a stalemate. Neither Obama, nor Trump, however, couched the assistance in terms of security commitments pledged in the Budapest Memorandum.

That's a shame. Russia's breach of the memorandum undermines not only Ukraine's security but the very logic of the nuclear nonproliferation regime. The NPT is inherently discriminatory: it recognizes only five nuclear possessors, which also happen to be the UN Security Council's permanent five members, yet demands nuclear abstinence from the remainder of the state-parties. The recognition of this exceptional status for the Nuclear Five puts them under a special onus not to abuse this status for their own gain, lest the legitimacy of the bargain at the core of the NPT be eroded.

The NPT, which is approaching its 50th year in force, has been one of the greatest achievements in arms control. It has, however, come under much stress in the past decade. The nuclear possession of Israel, India, and Pakistan outside of the regime has been steadily normalized. Efforts to create a Middle East Nuclear Free Zone, bring the Comprehensive Test Ban Treaty into force, and negotiate a Fissile Material Cut-off Treaty have grounded to a halt. Bilateral US-Russian arms control architecture is crumbling, while the two states that together hold 90 percent of world's nuclear weapons are pursuing ambitious strategic modernization programs. The rift between the nuclear haves and have-nots has grown as the latter are increasingly frustrated by the inadequate efforts of the former to fulfill their obligations under the Treaty to halt the arms race and conduct negotiations toward total and complete disarmament.

Now Russia, an NPT nuclear-weapons state, has used military force to wage war against Ukraine, a non-nuclear state that had once surrendered the world's third-largest nuclear arsenal, while the United States, another NPT nuclear-weapons state, makes the assistance it had pledged for just such an eventuality conditional on serving its internal political games. In short, neither nuclear power is upholding its end of the Budapest Memorandum bargain.

None of this bodes well for the nuclear nonproliferation regime. Iran, North Korea, and other aspiring proliferators are taking notes: their leaders will be circumspect when the United States promises economic and security rewards in exchange for greater restrictions on those countries' nuclear programs. Conversely, providing support to those who do the right thing by denuclearizing would help bolster the salience of the nonproliferation regime and make future nonproliferation efforts more effective. If President Trump indeed intends to make America great (again) he should honor his country's commitments, without deferring to others.

Mariana Budjeryn, PhD, is a research fellow with the Project on Managing the Atom and the International Security Program at the Harvard Kennedy School's Belfer Center for Science and International Affairs. She is working on a book about the nuclear disarmament of Ukraine....

<https://thebulletin.org/2019/10/impeachment-backstory-the-nuclear-dimension-of-us-security-assistance-to-ukraine/>

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Defense News (Washington, D.C.)

3 Ways America Can Fix Its Vulnerability to Cruise Missiles

By Bradley Bowman and Andrew Gabel

Oct. 29, 2019

September's drone and cruise missile attack on a major Saudi energy facility highlights the challenges associated with cruise missile defense. Americans might be tempted to dismiss this attack merely as evidence of a Saudi vulnerability, with little relevance to the U.S. homeland. However, given that an American-built air defense system failed to stop the attack, this would be a mistake.

As China and Russia continue to develop and deploy advanced cruise missiles to threaten the United States, urgent action is required. In recent years, the Pentagon has focused on protecting the homeland from ballistic missile attacks by building a ballistic missile defense system consisting of radars and interceptors. This system can provide some protection against a limited ballistic missile attack on the United States, but it is not designed to protect American cities from cruise missile attacks.

Unlike ballistic missiles, which arc high into the atmosphere and beyond before striking their target, cruise missiles fly at low altitudes, where ground-based radars struggle to detect them. And to defeat a cruise missile, the Department of Defense must first be able to detect and track it.

America's adversaries "currently hold our citizens and national interests at risk," the commander of Northern Command, Gen. Terrence O'Shaughnessy, testified before the Senate in April. "The homeland is not a sanctuary. For that reason, improving our ability to detect and defeat cruise missile attacks is among my highest priorities."

It is not difficult to understand why. Seeing this long-standing vulnerability, America's great power adversaries have worked to improve their cruise missile capabilities. Today, for example, Russia possesses a submarine-launched cruise missile that Moscow could use to circumvent existing U.S. missile defenses and target key East Coast military bases and population centers.

And the cruise missile capabilities of U.S. adversaries are only growing more formidable. In April testimony before the Senate, Under Secretary of Defense for Policy John Rood warned that potential adversaries are developing sophisticated "cruise missile systems with increased speed, range, accuracy and lethality."

For its part, Russia is developing hypersonic cruise missiles. Russian President Vladimir Putin claims one of these cruise missiles could fly as fast as nine times the speed of sound. The Kremlin is also pursuing nuclear-powered cruise missiles with virtually unlimited range. Not to be outdone, China is developing its own hypersonic cruise missiles, supplementing its existing cruise missile stocks.

Against both Moscow and Beijing's cruise missile arsenals, America's current defenses are inadequate.

So what's to be done?

The first step is for the Department of Defense to quickly assign a lead in the Pentagon for homeland cruise missile defense, which would enable key decisions related to the homeland cruise missile defense architecture — including decisions related to sensors and shooters, as well as command and control, battle management, and communications. This would help expedite efforts to integrate ballistic missile defense and cruise missile defense.

Second, Congress should support efforts to deploy without delay the space-based sensors necessary to detect, track and ultimately defeat advanced cruise missiles and other missile threats to our homeland.

Third, the Department of Defense should proactively look to partner with its impressive array of allies and partners to field — both at home and abroad — advanced cruise missile defense capabilities without delay.

Consider the United Kingdom, Canada, Australia and New Zealand. These allies are already part of a long-standing intelligence sharing arrangement with the United States, known as the “Five Eyes agreement.” As Atlantic Council Senior Fellow William Greenwalt has suggested, systematically expanding this arrangement to institutionalize the shared development of military technology makes sense. Cruise missile defense might be one of several good places to start.

Israel represents another obvious partner, as it possesses a proven track record on missile defense innovation, deep real-world experience, an admirable sense of urgency and a long history of cooperation with the U.S. on missile defense. Indeed, Israel and the U.S. have worked together for years to develop the Arrow and David’s Sling missile defense systems.

If we combine these international partnerships with the innovation prowess of the American private sector — as well as timely, predictable and sufficient funding from Congress — much can be done to address areas of shared vulnerability. That includes cruise missile defenses for both the American homeland and forward-deployed U.S. troops.

The September attack on the Saudi energy facility may seem of little concern to most Americans, but that attack should serve as a warning regarding the unique challenges associated with cruise missile defense. If Iran could pull off such an attack, imagine what Moscow and Beijing may be able to do. If our great power adversaries believe a surprise cruise missile attack against the U.S. homeland or American positions abroad might succeed, it increases the chances that Beijing or Moscow would undertake such an attack.

The Pentagon assessed in its Missile Defense Review earlier this year that advanced cruise missile threats to the homeland “are on the horizon.” The attack last month in Saudi Arabia suggests that horizon might be closer than Americans think.

Bradley Bowman is the senior director for the Center on Military and Political Power with the Foundation for Defense of Democracies, where Andrew Gabel is a research analyst.

<https://www.defensenews.com/opinion/commentary/2019/10/29/3-ways-america-can-fix-its-vulnerability-to-cruise-missiles/>

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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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