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Feature Report

“Under the Nuclear Shadow: Situational Awareness and Crisis Decisionmaking”. Published by Center for Strategic & International Studies; March 2020

https://csis-prod.s3.amazonaws.com/s3fs-public/publication/200318_UnderNuclearShadow_FullReport_WEB.pdf?Vjm_nrx2bVVeByYH38yx8YkDvvr1QZVW

Improvements to strategic situational awareness (SA)—the ability to characterize the operating environment, detect and respond to threats, and discern actual attacks from false alarms across the spectrum of conflict—have long been assumed to reduce the risk of conflict and help manage crises more successfully when they occur.

However, with the development of increasingly capable strategic SA-related technology, growing comingling of conventional and nuclear SA requirements and capabilities, and the increasing risk of conventional conflict between nuclear-armed adversaries, this may no longer be the case.

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They provide flexible deterrence with their nuclear capability, forcing adversaries to think twice before starting an attack.

NUCLEAR WEAPONS

Aiken Standard (Aiken, S.C.)

NNSA Study: Los Alamos National Lab Could Boost Pit Production to Meet National Needs

By Colin Demarest

March 13, 2020

Los Alamos National Laboratory in New Mexico could end up producing 80 plutonium pits – nuclear weapon cores – per year, if the National Nuclear Security Administration's hand is forced, according to a forward-looking environmental study published this week.

New pit-related equipment and other upgrades to be installed at PF-4, a Los Alamos plutonium facility, would both "provide the ability to produce a minimum of 30 pits per year" and make possible "surge efforts to produce 80 pits per year" to meet national demands, the study, a draft supplement analysis of environmental impact, states.

Federal law requires the production of 80 plutonium pits – the triggers at the heart of modern nuclear weapons – by 2030. The 2018 Nuclear Posture Review, an updated Pentagon policy document ordered by President Donald Trump, further reinforced the need for an 80-pits-per-year capability.

The U.S. has not had for years a significant ability to make the nuclear weapon cores. The last place pits were produced en masse, the Rocky Flats Plant in Colorado, was raided by the FBI decades ago and was subsequently shuttered.

In May 2018, the Department of Energy's National Nuclear Security Administration and the Department of Defense together recommended making pits at two places: the Savannah River Site, south of Aiken, and Los Alamos, a storied plutonium center of excellence near Albuquerque and Santa Fe.

The Savannah River Site would pump out a majority of the pits, 50, by 2030, whereas Los Alamos would produce the remainder, 30, they counseled. A tandem, cross-country approach is more flexible, officials say, and prevents a single failure from crippling the entire endeavor.

Critics and doubters, though, certainly do exist.

Should something not work out at the Savannah River Site – an entirely new facility, the proposed Savannah River Plutonium Processing Facility, needs to be designed and built with the bones of the multibillion-dollar Mixed Oxide Fuel Fabrication Facility, among other things – Los Alamos would, seemingly, span the production gap.

The NNSA already operates at the 310-square-mile Savannah River Site, near the South Carolina and Georgia border, and sports a palmy footprint there. The weapons-and-nonproliferation agency formally canceled the flagging MOX project in October 2018.

Hitting the 30-pits-per-year mark at Los Alamos, according to the NNSA's new environmental review, would require hundreds more people. "Reassignments" would be required for any production surges, the study states, and the need for more workers would need evaluating.

"It is assumed that actions for 30 pits per year are completed prior to developing the ability to implement a short-term surge capacity," reads the National Nuclear Security Administration's draft supplement analysis, a lengthy work that some nuclear watchers have denounced.

"This document contradicts statements that the laboratory and the NNSA have been saying for the last six months," Greg Mello with Los Alamos Study Group said Thursday.

"The upshot is that NNSA is building an 80 pits per year pit production capability at LANL right now," Mello said separately.

https://www.aikenstandard.com/news/nnsa-study-los-alamos-national-lab-could-boost-pit-production/article_81c32b0c-646f-11ea-98f1-5b5eafe400cc.html

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Australian Strategic Policy Institute (Canberra, Australia)

Coercion, Deterrence and Australia's Long-range Strike Options

By Rod Lyon

March 19, 2020

My ASPI colleague Marcus Hellyer's two recent posts open up a range of questions about the future role of long-range strike capabilities in Australian strategy. One of the more important questions involves what we want long-range strike to do. At the risk of being overly reductionist, I'd suggest that proponents of long-range strike can be divided into two groups: those who envisage an offensive role for such capabilities and those who envisage solely a defensive one. In part, the division turns on the issue of China, and whether Australia should be prepared to target the Chinese homeland during a conflict. But it turns too on theoretical arguments, such as whether deterrence by denial really is 'inherently more reliable' than deterrence by punishment.

Most warfare involves contests in short-range and medium-range weaponry. No surprise there—most of those who fight are neighbours. Even today, long-range strike capabilities are relatively rare. The P5 countries—China, France, Russia, the UK and the US, all of which are officially recognised as nuclear-weapon states under the Nuclear Non-Proliferation Treaty—have them. Among the four non-official nuclear-armed states, India and North Korea are working to develop intercontinental-range delivery systems, but Pakistan and Israel aren't. It's not entirely coincidental that the list essentially comprises nuclear-capable states: for a long time the limited accuracy of long-range systems has meant that only a nuclear warhead could compensate for 'circular error probables' that measured in the hundreds, if not thousands, of metres.

So, for most countries, the issue of what to do with long-range strike capabilities simply doesn't arise. Even in the case of Australia, a country used to fighting its wars at considerable distance from its shores, most of our thinking about long-range strike has been subcontracted to our major ally, the US. Thinking about how we might use an indigenous long-range strike capability has been relatively rare. That it resurfaces now, at a time of shifting relative strategic weight in the Asian great-power balance, means the debate automatically centres on the rising authoritarian power, China.

So, how might Australian long-range strike capabilities—China, remember, already has them—contribute to establishing a more stable strategic relationship between Canberra and Beijing?

Let's start with the concept of deterrence. In a purely definitional sense, deterrence is a show-stopper. It occurs when country A persuades country B not to undertake a specific action by threatening to impose a set of costs on country B that would exceed the likely benefits it would gain from undertaking the action.

That's accurate, but long-winded and dull. And it just tells us how deterrence works, rather than what it is. So, what is it? Deterrence is a chapter in the playbook of coercion. And coercion springs from what Thomas Schelling called 'the power to hurt'. The power to hurt is important because it underpins bargaining power.

That description probably horrifies some readers. Western audiences today like discussions about power to be qualified by adjectives like 'soft' and 'smart'. Coercion, in particular, doesn't get a lot of mileage in Australian defence white papers. Indeed, we're inclined to think that coercion is bad, that China coerces but we don't, and that we live by higher standards and finer principles, essentially those of a 'rule-bound' international order.

Moreover, in recent decades Western military capabilities have emphasised precision strike—ironically, the deliberate minimisation of pain—as the key principle in force design. That's enabled smaller warheads to be effective against targets that previously would've required larger ones.

It's possible to argue that the credibility of both deterrence by punishment and deterrence by denial has increased—the first can be more selective, the second more effective. But do adversaries really fear accurate destruction more than gross destruction? If so, why do nuclear weapons retain their strategic importance?

Summing up on this point, when we're asking ourselves what the link might be between deterrence and long-range strike weapons, we're specifically asking how such capabilities would allow us to coerce another power—that is, how we might threaten them to our political advantage.

Second point: country B doesn't have to be merely another second-tier power like us. In deterrence relationships, it matters not which country is stronger. What matters is whether country A can credibly threaten to impose on country B a set of costs that country B finds painful.

That's why North Korea's successful, if so far limited, testing of an intercontinental ballistic missile and a thermonuclear warhead is strategically significant. It allows Pyongyang to threaten to impose on the US a set of costs that Washington would find unacceptable even if it could, in response, turn North Korea into a radioactive carpark. That is to say, its subsequent devastation of North Korea would not reduce America's suffering to any noticeable degree.

French nuclear doctrine during the Cold War turned on precisely the same axis: it threatened to undo the Soviet Union's standing as a great power. Yes, Moscow could retaliate, but it could not escape the effects of a French strike.

Now, in both those cases, nuclear weapons provide important leverage. It might be that Australia is unwilling to head down the path to nuclear weapons. And in terms of deterrence, that would be a serious constraint, for the sheer destructiveness of nuclear weapons provides a solid foundation for a diplomatic stance based on coercive threats.

True, the same principles of deterrence apply at the conventional-weapon level. But it's hard to threaten an aggressor with a set of costs that its leadership would find unacceptable if we don't have some heavyweight escalation options. And we certainly can't do that by prematurely rushing to reassure China that its homeland wouldn't be targeted during a conflict with Australia. After all, Beijing is giving us no such reassurance.

A third point: trying to constrain Australia's future long-range strike capabilities to those which would augment our existing doctrine—essentially 'defence of Australia' accompanied by a side-dish of Pacific 'step-up'—puts the cart before the horse. Despite Hugh White's recent effort to show that the defence of Australia doctrine could be deployed against a superpower, it was designed in the 1980s to do something different. It was a formula for managing low-level threats, in a world of US primacy and great-power accommodation. That's not the future we confront. Belatedly appending

to that formula a long-range anti-ship missile capability, so we can threaten the targeting of Chinese ships as they pull out of Hainan, merely confuses an already overburdened defence doctrine.

The threat to hurt is difficult to leverage from a strategic posture that insists on 'defensive defence'—readers of a certain age might remember the NATO debates of the early 1980s on just that topic. After all, what 'threat' would we be actually making? We'd be 'threatening' to defend ourselves against another country's military forces that were already attacking us. The potency of the threat depends on Beijing's weighing of a shifting balance of conventional forces in a prospective battle far distant from its shores. That threat's not particularly coercive, not when weighed alongside more offensive possibilities.

Where does that leave us? Three points. Deterrence is the political return from coercive threat. Effective threats can be made against a stronger power by a weaker one. And offensive threats—especially offensive threats of gross destruction—possess a persuasiveness not easily matched by defensive threats. We need to approach the issue of long-range strike with those lessons in mind.

AUTHOR

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<https://www.aspistrategist.org.au/coercion-deterrence-and-australias-long-range-strike-options/>

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National Defense (Arlington, Va.)

Political Battle Brewing Over New Nuclear Program

By Jon Harper

March 17, 2020

The Trump administration's proposal to begin work on a new nuclear warhead program to modernize the nation's aging stockpile is expected to be hotly contested.

For fiscal year 2021, President Donald Trump requested \$28.9 billion for the Pentagon's nuclear enterprise. He requested an additional \$15.6 billion for efforts by the National Nuclear Security Administration, which manages the stockpile, including \$53 million for NNSA work on a new warhead, dubbed the W93.

The Pentagon's budget blueprint includes \$480 million for work on the weapon system over the future years defense program, with \$32 million slated for 2021.

The W93 is intended for the Navy's submarine-launched ballistic missiles, according to senior defense officials. There are currently two families of warheads for the sea-based leg of the triad: the W76 and the W88.

"Both of these systems are growing old, and so now we must start thinking about a warhead that will replace one of those two when it's time for those systems to retire," a senior defense official told reporters during a background briefing. "These things take a long time. There's a seven-stage process by which we start to develop a warhead."

The W93 will provide U.S. Strategic Command and the Navy a means to address evolving ballistic missile warhead modernization requirements, improve operational effectiveness, and mitigate technical, operational and programmatic risk, Stratcom Commander Adm. Charles Richard said during a recent Senate Armed Services Committee hearing.

“Given the potential severity of impacts on overall deterrence from late delivery of the W93/Mk7, it is imperative [to start] the complex work to identify opportunities to accelerate the development timeline and invest in technologies to reduce schedule risk,” Richard said.

“Research-and-development efforts for critical national capabilities, such as fuzes and aero shells, must begin immediately to deliver a capability in the 2030s that maintains a credible at-sea deterrent through the 2050s and beyond,” he added.

The Department of Energy has estimated that the program will cost about \$10.9 billion in 2019 dollars.

Hans Kristensen, director of the Nuclear Information Project at the Federation of American Scientists, said the \$10.9 billion estimate is “low-balling it.” A new fuze is also needed, he noted in an email. “New fuzes are expensive.”

Other components could increase the price tag.

“The W88 uses the Mk5 [reentry body] but the W93 will likely use a new Mk7, which will add to the cost projection,” Kristensen said. “A W93 using Mk7 obviously will be more expensive than the standard life-extension programs.”

The warhead will be based on previous designs and will not require any nuclear testing, and the program won’t increase the size of the stockpile because it will replace older warheads on a one-for-one basis, defense officials say.

Nuclear modernization programs, especially those related to warheads, have put Republicans and Democrats at loggerheads in the past.

“This will be, I predict, the probably most contentious issue in this year’s defense authorization bill about modernizing the stockpile,” House Armed Services Committee Ranking Member Rep. Mac Thornberry, R-Texas, said during recent remarks at the Brookings Institution. “There is a temptation to say, ‘Oh, it’s worked pretty well so far. Why do we need to mess with it and spend all this money?’”

Thornberry said the nuclear arsenal needs to be modernized.

However, Democrats may not go along with the W93 plans.

“Congressional leadership has yet to receive the military requirement or justification for another new nuclear warhead,” a spokesperson for HASC Democrats said in an email.

“As recently as July 2019, the Department of Energy projected it would begin work on this warhead in 2023. Work on this new warhead will add billions of dollars to an already strained nuclear modernization plan.”

HASC Chairman Rep. Adam Smith, D-Wash., “looks forward to reviewing and considering NNSA’s budget request to better understanding their priorities and plans,” the spokesperson added.

<https://www.nationaldefensemagazine.org/articles/2020/3/17/political-battle-brewing-over-new-nuclear-program>

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Air Force Magazine (Arlington, Va.)

STRATCOM: Triad's Isolation Keeps Nuke Operations Normal Amid Outbreak

By Brian W. Everstine

March 17, 2020

The nation's nuclear triad is working to get ahead of the new coronavirus outbreak by placing key personnel in "protective self-quarantines." U.S. Strategic Command also is prescreening Airmen and depending on long-established redundancies in a community designed to operate independently, the head of U.S. Strategic Command said.

So far, there no personnel at STRATCOM headquarters or at service-level commands have tested positive for COVID-19, the disease caused by the new coronavirus, command boss Adm. Charles Richard told reporters March 17. The impact of the virus has so far been "minimal."

This is because the nuclear forces are designed to be able to operate cut off from the rest of the world. For example, Air Force missileers hold alert shifts in hardened bunkers in remote areas and submarines spend months at sea in undisclosed areas. "My organization is designed to be able to operate isolated for long periods of time," Richard said.

He would not go into specifics, however, about how personnel, such as missileers or bomber pilots, are protecting themselves from the outbreak.

At the headquarters level, at Offutt Air Force Base, Neb., the command has followed the model that has taken shape at the Pentagon and in much of corporate America as the outbreak has continued. There have been more virtual teleconference meetings as opposed to face to face, a move Richard said he is excited about.

The technological communications capabilities available to his command could be used for "more efficient ways of accomplishing our business," he said.

Within the Air Force Global Strike Command, under the direction of STRATCOM, aircraft have remained busy. USAF B-2 bombers on March 17 flew alongside Norwegian F-35s and F-15s from RAF Lakenheath, England, for an Icelandic Air Policing mission, according to a U.S. Air Forces in Europe release. The B-2s are in Europe for a Bomber Task Force deployment.

<https://www.airforcemag.com/stratcom-triads-isolation-keeps-nuke-operations-normal-amid-outbreak/>

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US COUNTER-WMD

Defense News (Washington, D.C.)

BAE Nabs Next-Gen Seeker Design Work for US Army's Missile Defense System

By Jen Judson

March 18, 2020

WASHINGTON — Lockheed Martin, which builds the Terminal High Altitude Area Defense weapon system for the U.S. Army, has awarded BAE Systems a contract to design and manufacture a next-generation seeker for the system's interceptors, according to a BAE announcement posted March 17.

"The sensor design work will improve the missile defense system's ability to neutralize more threats and improve its manufacturability," the statement read. The company did not disclose the contract amount or timelines to develop a design.

The THAAD weapon system is part of the Army's layered approach to missile defense, now with its ability to defeat ballistic missile threats in the terminal phase of flight, but the Missile Defense Agency also wants to make it part of its future homeland defense architecture.

BAE already provides the seeker for the THAAD system, which uses infrared imagery to guide the interceptors to threat targets, and the company has delivered more than 500 THAAD seekers to date, according to the statement.

While the seekers are built in Nashua, New Hampshire, and Endicott, New York, the company plans to conduct design work for the next-generation seeker in Huntsville, Alabama, home of Redstone Arsenal and the Army's missiles and space programs.

BAE Systems is building a state-of-the-art facility that will house a "cutting-edge" design program in Huntsville, the company noted.

While the Army plans to continue using THAAD far into the future, the MDA is, in fiscal 2021, planning to allocated \$273.6 million for THAAD development efforts, including the THAAD homeland defense tier.

Specifically, the agency is asking for \$139 million in FY21 to start the development and demonstration of a new interceptor prototype for THAAD, which could support a tiered and layered approach to homeland defense.

BAE Systems did not say whether the next-generation interceptor design work includes efforts related to MDA's desire to produce a new interceptor prototype.

The agency is "challenging ourselves" to figure out how to develop a THAAD interceptor that would work against an intercontinental ballistic missile, Vice Adm. Jon Hill, the MDA's director, said when the FY21 defense budget request was released in February. To do that, the MDA is seeking to draw lessons from building THAAD batteries for Saudi Arabia, he said.

The agency is also looking at the existing engineering trade space.

"We may consider an upgraded propulsion stack to give [THAAD] extended range, don't know yet," he said. "It could be that we don't want to update the propulsion. Maybe there is something in the seeker that would buy us more in the trade space now."

The THAAD interceptor program is a new start in the FY21 budget request, Hill noted. “We are working our way through what that program would look like.”

<https://www.defensenews.com/smr/army-modernization/2020/03/17/bae-nabs-next-gen-seeker-design-work-for-us-army-missile-defense-system/>

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Global Biodefense (Seattle, Wash.)

Chasing the Antidote for Deadly Nerve Agents

By Global Biodefense

March 13, 2020

In the most comprehensive, structure-based approach to date, a team of scientists may have discovered a new family of antidotes for certain poisons that can mitigate their effects more efficiently compared with existing remedies.

Poisons such as organophosphorus nerve agents and pesticides wreak havoc by blocking an enzyme essential for proper brain and nerve function. Fast-acting drugs, called reactivators, are required to reach the central nervous system and counteract damage that could lead to death.

“To enhance the antidote’s effectiveness, we need to improve the reactivator’s ability to cross the blood-brain barrier, bind loosely to the enzyme, chemically snatch the poison and then leave quickly,” said Oak Ridge National Laboratory’s Andrey Kovalevsky, co-author of a study led by Zoran Radić of UC San Diego.

The team designed and tested reactivators on three different nerve agents and one pesticide with positive initial results. Their next step is to use neutron crystallography to better understand antidote designs.

<https://globalbiodefense.com/2020/03/13/chasing-the-antidote-for-deadly-nerve-agents/>

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C4ISRNET (Vienna, Va.)

The MDA Is Still in Charge of Hypersonic-Tracking Space Sensors

By Nathan Strout

March 16, 2020

The Missile Defense Agency will continue development of a space-based sensor capable of tracking hypersonic threats even though funding for the program is moving to the Space Development Agency, MDA’s director told members of Congress at a March 12 hearing.

Responsibility for the program was a source of friction between the Department of Defense and Congress in 2019, with lawmakers pushing for the MDA to be the lead agency on the effort.

The Hypersonic and Ballistic Tracking Space Sensor is meant to counter the growing threat of hypersonic weapons being developed by Russia and China. Using a proliferated constellation of sensors in low earth orbit, HBTSS will be able to detect, track and maintain custody of hypersonic weapons as they traverse the globe, feeding that information to fire control systems that can eliminate the threat. HBTSS will be part of the SDA’s new architecture consisting of hundred of satellites working together in low earth orbit, with the first tranche expected on orbit in 2022.

The MDA awarded four \$20 million contracts to companies to develop HBTSS prototypes in October. The four companies selected were Northrop Grumman, Leidos, Harris Corporation and Raytheon.

While the program was not included in the MDA's fiscal year 2020 budget, the agency asked for \$108 million for the effort as part of its unfunded priorities list.

Members of Congress pushed for the MDA to be the lead agency on HBTSS throughout 2019, despite pushback from the White House, who claimed it was too early to select a lead with the MDA, SDA and DARPA all contributing to the program. So when legislators passed the National Defense Authorization Act in December, they included language directing the MDA to take primary responsibility for the development and deployment of HBTSS.

So members of the House Armed Services Committee Subcommittee on Strategic Forces were understandably concerned when the MDA's fiscal year 2021 budget documents stated that funding for HBTSS was moved to the SDA.

"In the last NDAA, we instructed--Congress instructed--that that development take place in the MDA. It was, as we understand, moved over to the Space Development Agency and then in this year's PB21 it says that it's transferred to SDA. Who's working on this sensor capability?" asked Rep. Mike Rogers, R-Ala. at the March 12 hearing.

"These kinds of budget choices indicate a significant lack of judgement in determining which requirements are being pursued in our missile defense enterprise," said Rep. Michael Turner, R-Ohio, the subcommittee's ranking member. "I remain skeptical of the near-term programmatic direction of the missile defense."

MDA Director Vice Adm. Jon Hill tried to reassure legislators, explaining that while the funding was moving to the SDA, his organization would remain in charge of sensor development for HBTSS. Under the newly proposed arrangement, the SDA would provide funding to the MDA to develop the sensor, which will in turn be given to the SDA to incorporate into their proliferated LEO constellation.

Hill said the decision to move the funding was made by Under Secretary of Defense for Research and Engineering Michael Griffin, who wanted to consolidate space funding under the SDA. Griffin has been the most outspoken advocate within the Department of Defense for the nascent organization.

"He's trying to consolidate the dollars for space, because it's such an important capability that we need," said Hill, noting that there was no daylight between him and his equivalent at the SDA. "What I do recognize is a concern for the Congress is visibility into how those dollars are leveraged and making sure that MDA is in charge of building that sensor. There's been no change in that strategy for MDA to remain the developer for that sensor and to provide that to SDA as part of their architecture."

<https://www.c4isrnet.com/battlefield-tech/space/2020/03/16/the-mda-is-still-in-charge-of-hypersonic-tracking-space-sensors/>

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US ARMS CONTROL

Omaha World-Herald (Omaha, Neb.)

Esper Won't Replace Offutt's Aged Open Skies Reconnaissance Planes until Fate of Treaty is Decided

By Steve Liewer

March 12, 2020

The maintenance team at Offutt Air Force Base's 55th Wing is going to have to keep its ancient, trouble-prone OC-135 photo reconnaissance planes flying at least a few more years.

Defense Secretary Mark Esper told the Senate Armed Services Committee last week that he won't spend money appropriated by Congress last year to buy a replacement jet for the missions, which are mandated by the 1992 Open Skies treaty, because of political uncertainty over the treaty's future. Those two jets, both based at Offutt and flown by Offutt crews, were built in 1961 and have a checkered maintenance history.

He said he toured one of the planes during his visit to Offutt last month and talked with some of the crew members.

Congress has appropriated at least \$41.5 million toward replacing the jets in its 2020 budget. About \$250 million is needed. A bidding process was to be started in April, and a contract awarded in September, according to Trump administration budget justification documents. The planes were expected to be delivered beginning in 2024.

But Esper appears poised to halt the purchase in light of recent efforts by a faction of conservative Republicans to pull the U.S. out of the treaty.

"Until we make a decision about the path forward, I'm not prepared to recapitalize aircraft," Esper said at the committee hearing March 4, adding that the U.S. and its NATO allies "need to speak out more clearly about Russian noncompliance."

There's little doubt new planes are needed. The OC-135Bs were built by Boeing at the dawn of the jet age. The four-engine aircraft are based on the same airframe as the Boeing 707 civilian airliner, the company's first jet, which was last flown by U.S. airlines in 1983.

The Trump administration's budget justification document states that the OC-135Bs have experienced "decreasing mission reliability due to age, difficulties with out-of-production parts, and increased operating costs." The document said the planes have completed just 65% of their missions between 2007 and 2017, driven by failures in their engines, fuel system, landing gear, generators and airframe.

"By not recapitalizing the Open Skies aircraft, we are adding risk to our aircrews," said Rep. Don Bacon, R-Neb., a retired Air Force brigadier general who formerly commanded the 55th Wing, including the OC-135s. "The current aircraft are old, have bad maintenance rates and are prone to breakdown in Russia, putting our crews in bad situations where they are harassed by Russian authorities."

The Open Skies treaty allows the 34 member nations — including the United States, Canada, Russia and most European countries, in addition to — the right to conduct supervised aerial photography flights over one another's territory, using expensive cameras, known as sensors, whose capabilities are strictly regulated by the treaty.

The treaty enjoyed bipartisan support until several years ago, when a hard-line faction of Republicans, including former National Security Adviser John Bolton and Sens. Tom Cotton of Arkansas and Ted Cruz of Texas, began working to scuttle the treaty. They have alleged that Russia is leveraging it to gain an unfair advantage over the United States.

“The Open Skies Treaty no longer serves to reduce tensions or build trust, if it ever did. Instead it gives Russia a spying capability it wouldn’t otherwise possess, which jeopardizes U.S. security,” Cotton said in a Washington Post op-ed published in December.

Cotton and other critics have cited restrictions of flights along the border of several conflict zones within the neighboring Republic of Georgia where pro-Russian breakaway governments have declared independence. There are also restrictions on the length of flights over Kaliningrad, a Russian enclave on the Baltic Sea that is packed with military sites.

The treaty’s defenders, though, say it is still quite valuable, especially to our allies, by letting them keep an eye on each other. It also keeps NATO militaries working together, since most U.S. missions are flown in partnership with other countries.

“The Open Skies Treaty is a cornerstone of European security and stability. Crucially, it allows even small countries to get information on military activities around them,” said Rep. Emanuel Cleaver II, D-Mo., at a House Armed Services Committee hearing last October. “The violations should be dealt with by diplomatic means, not used as a case for hasty withdrawal.”

Last fall, the National Security Council reportedly drafted a letter directing the U.S. to begin efforts to withdraw from the treaty. Bacon and Rep. Jeff Fortenberry co-sponsored legislation — later included in the Defense authorization bill — that would place procedural hurdles in the way of withdrawal and require notice to Congress.

“I think we needed to let the White House know, ‘Hey, we’re going to stand up and defend this,’” Bacon said in October.

Nebraska Sen. Deb Fischer said in a statement that she continues to support the new aircraft, but she deferred to the Trump administration on whether the U.S. should stick with the treaty.

“I have advocated for the recapitalization of the OC-135B,” she said. “Should the administration elect to remain in the treaty, I will continue to do so.”

In his Washington Post op-ed, Cotton conceded that the old planes are in bad shape. But he sees no value in replacing them.

“Modernizing these aircraft would cost nearly a quarter-billion dollars,” Cotton said. “The money would be better spent on tools that increase the combat effectiveness and survivability of U.S. troops.”

https://www.omaha.com/news/military/esper-won-t-replace-offutt-s-aged-open-skies-reconnaissance/article_5c925ae8-e4c8-5cb3-8242-b061dd9edfd6.html

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Berkeley Engineering (Berkeley, Calif.)

Can Tiny, Invisible Particles Help Stop the Spread of Nuclear Weapons?

By Thomas Lee

March 12, 2020

The key to preventing nuclear proliferation may depend on a little bit of ghost hunting.

Scientists have long been interested in a device that can detect neutrinos, ghost-like particles that have no electric charge and nearly no mass — and therefore can pass through matter. Now, researchers are closer than ever to deploying technology that can spot those elusive subatomic particles and, in doing so, alert international authorities to the illicit production of plutonium, a key fuel for nuclear bombs.

The technology may provide a “way to monitor the plutonium content in a nuclear reactor in real time that we just don’t have right now,” said Bethany Goldblum (M.S.’05, Ph.D.’07 NE), a top researcher with UC Berkeley’s Department of Nuclear Engineering.

Goldblum, the executive director of the Berkeley-based Nuclear Science and Security Consortium, co-wrote a study published this week in the *Review of Modern Physics* that examines the feasibility of neutrino detectors in nuclear nonproliferation efforts. The study’s co-authors include Adam Bernstein and Nathaniel Bowden from Lawrence Livermore National Laboratory, Patrick Huber from Virginia Tech, Igor Jovanovic from the University of Michigan and John Mattingly from North Carolina State University.

The study ultimately concludes that such technology deployed outside nuclear reactors could prove effective in ensuring that countries are not making weapons-related material under the guise of peaceful civilian energy production. The report also advances the idea that researchers could one day use the technology to discover or exclude the presence of reactors at distances of a few hundred kilometers.

“Over several decades, physicists have conceived many ideas for using fission neutrinos in nuclear security,” the study says. “Some ideas remain in the realm of pen and paper, constrained by basic physical and practical considerations. For other concepts, demonstrated technology is catching up with real opportunities.”

The ghost particle

Neutrinos are the most abundant particles in the universe, having been formed by large nuclear explosions like the Big Bang, supernovas and the fusion process that happens inside the sun. They travel near the speed of light, have little mass and carry no electric charge.

Because of these attributes, neutrinos can pass through matter and are incredibly difficult to detect, which is why scientists often refer to them as “ghost particles.” For example, if 10 trillion neutrinos struck the Earth, all but one would pass through the planet without having interacted with anything at all.

In 1956, Clyde Cowen and Frederick Reins, two scientists at the Los Alamos National Laboratory in New Mexico, confirmed the neutrino’s existence, work that eventually earned the Nobel Prize in Physics. The duo placed two large water tanks near a nuclear reactor, which produces electron antineutrinos in huge quantities, as part of the fission process.

As it turns out, neutrinos can collide with protons in the water and produce a neutron and a positron through a process called inverse beta decay. When the positron moves through the water, it produces a flash of light that special sensors can detect.

Up to this point, scientists were primarily interested in finding neutrinos because the particles might offer clues to the universe's origin and the formation of stars and galaxies. But starting around the turn of the 21st century, the idea that neutrino detectors could be used in nuclear nonproliferation efforts started to gain real traction.

In 2000, Adam Bernstein, then a postdoctoral fellow at the Sandia National Laboratory in Livermore, California, wrote a paper exploring the idea of using detectors filled with purified water to spot neutrinos produced from nuclear explosions.

In many ways, water is a great medium to detect neutrinos because it is easy to purify, cheap and is transparent to light produced by neutrinos colliding with water molecules. The key would be to build detectors big enough to hold enough water to see the neutrino signal above background radiation.

However, finding neutrinos in water is still pretty hard. Bernstein found that adding small amounts of gadolinium — a rare earth metal with unusual nuclear properties — to the water could significantly boost the detector's chances of spotting neutrinos. In gadolinium-doped water, neutrino interactions produce a much stronger signal than neutrinos in water alone.

Bernstein eventually abandoned the idea to monitor explosions because the cost and size of such neutrino detectors would make the technology impractical, especially compared to existing, cheaper technologies like seismic detectors, he said.

Instead, Bernstein turned his attention to using the gadolinium-doped technology to catch neutrinos from nuclear reactors.

"Since we're still mostly using water, it is possible to build large detectors, up to 100 kilotons in size or more, to spot these reactor neutrinos," said Bernstein, now a staff physicist at the Lawrence Livermore National Laboratory and director of the lab's Rare Event Detection group in the Nuclear and Chemical Sciences division.

"The neutrino signature would stand out much more readily above background radiation even in a big detector," he said.

Last year, the United Kingdom and United States announced the two countries would together invest roughly \$50 million into the Water Cherenkov Monitor for Anti-Neutrinos (WATCHMAN) project, a kiloton-scale antineutrino detector to be placed in an underground mine about 25 kilometers (15.5 miles) away from a nuclear power plant in West Yorkshire, England. The U.S. National Nuclear Security Administration and Lawrence Livermore National Laboratory are partners in the research effort.

Though WATCHMAN won't be operational until 2024, the effort has already "exceeded my expectations," Bernstein said.

"The idea that the nonproliferation community could use this technology that up until now has been the exclusive province of fundamental science is an exciting motivation for this work," he said.

Halting the spread of nukes

Since 1970, nearly 200 nations signed the landmark Treaty of the Non-Proliferation of Nuclear Weapons (NPT), which seeks to limit the spread of nuclear weapons.

Through a combination of remote monitoring and on-the-ground inspections, containment and surveillance, the International Atomic Energy Agency (IAEA) commands plenty of tools to figure out if countries are using nuclear energy for peaceful purposes, Goldblum said.

But what happens if the line between civilian and military use of nuclear energy is not so clear? For example, the United States has long accused Iran of trying to make nuclear weapons, but Iran says it wants to develop nuclear capabilities for civilian power generation.

The knowledge to construct a nuclear bomb is actually pretty well known. The hard part is getting enough materials — either enriched uranium or plutonium — to fuel the weapon. A country can reprocess the spent fuel from a civilian nuclear reactor and extract plutonium for a weapon. And a nuclear bomb only requires about 10 kilograms of plutonium.

The so-called “dual-use” capabilities of nuclear reactors presents a significant challenge to the IAEA.

“None of the countries now embarking on civil nuclear power programs say they are planning to acquire reprocessing capabilities,” according to a 2017 report by the Brookings Institute think tank.

“But many of them are unwilling to forswear what they consider to be their ‘right’ eventually to have dual-use capabilities.”

The neutrino detection technology could offer a solution. In addition to the large systems like WATCHMAN, scientists have constructed much smaller detectors that can be deployed close to reactor cores — provided operators allow such access.

Optimizing reactor power levels to produce plutonium, a telltale sign that a country is trying to build a bomb, will change the rate and energy spectrum of antineutrinos that a device parked outside of the reactor can detect.

And since these particles can pass through matter, the operator can’t shield the reactor’s release of antineutrinos the same way lead blocks X-rays. So if a country wants to operate a civilian nuclear power program, an antineutrino detector could provide an effective tool to continuously verify the reactor is only producing energy for peaceful purposes.

For now, a detector must stay within tens of meters of the reactor to be effective. But in the future, could such technology spot antineutrinos from longer distances and even across borders?

For distances 100 kilometers or beyond, the Review of Modern Physics study shows detectors would need to be 10 to 100 times bigger than WATCHMAN. But researchers hope WATCHMAN will demonstrate the basic technology and provide a platform for study of a range of possible enhancements to improve standoff and overall sensitivity.

And in any case, the mere knowledge that such technology has become a reality could prove to be a powerful deterrent to nuclear proliferation in itself.

<https://engineering.berkeley.edu/news/2020/03/can-tiny-invisible-particles-help-stop-the-spread-of-nuclear-weapons/>

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COMMENTARY

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

Did the Cyberspace Solarium Commission Live Up to Its Name?

By Joshua Rovner

March 19, 2020

Last week, as a real virus upstaged computer viruses, the congressionally mandated Cyberspace Solarium Commission released a sweeping plan to organize and guide U.S. cybersecurity policy. The commission took its name from Project Solarium, a secret study comparing options for confronting the Soviet Union early in the Cold War. Rep. Michael Gallagher, the commission's co-chair, has written extensively about the Eisenhower-era project, describing it as a model of incorporating intelligence into a competitive analytic exercise. The Eisenhower administration invited strategists to flesh out three options for confronting Soviet power in the shadow of nuclear weapons: containment, deterrence, and rollback. It believed that introducing competition would force advocates of each approach to sharpen and improve their arguments, and ultimately produce a more coherent grand strategy.

The administration organized three task forces to write reports describing each option. Each task force had seven members, who spent six weeks working in secret at the National War College. Everyone involved had access to the same data. Although many of the participants were obscure, there were notable exceptions. George Kennan, the diplomat who famously urged a "patient but firm" approach to the Soviet Union, led the task force on containment. The task force on rollback included two future NATO commanders, Col. Andrew Goodpaster and Lt. Gen. Lyman Lemnitzer. In June 1953, each group presented its findings in extended briefings to President Dwight Eisenhower, Secretary of State John Foster Dulles, the Joint Chiefs of Staff, and other principals.

The Cyberspace Solarium Commission originally planned something similar, with separate task forces conducting a "deliberate, structured debate" among different approaches to cybersecurity. These options roughly paralleled the public debate, where commentators have alternately championed a more robust commitment to international norms, more credible deterrent threats against adversaries, and what U.S. Cyber Command calls persistent engagement. Those favoring norms warn that cyberspace will remain vulnerable to predators until the international community gets serious about setting limits on acceptable behavior. Those favoring deterrence argue that predators will continue to operate, norms notwithstanding, until they face serious consequences for their actions. Those favoring persistent engagement, however, argue that continuous contact among rivals is built into the structure of the domain, and "setting the conditions for security" is only possible by being proactive. They explicitly reject deterrence.

A structured debate among these three perspectives may have been illuminating. But that is not what the Cyberspace Solarium Commission delivered. Unlike that of the original Project Solarium, the commission's report is a consensus product that includes all of them. The conceptual heart of the plan is called "layered cyber deterrence," an approach that seeks to reduce the risk of serious cyberspace attacks while simultaneously combating operations below the line of armed conflict. It recommends a combination of U.S. instruments — military, diplomatic, and economic — to reduce the benefit of cyberspace operations to hostile foreign adversaries. It also promises to increase the credibility of U.S. retaliatory threats by investing more in U.S. offensive cyberspace capabilities.

Strangely, the report also supports persistent engagement, and describes how to operationalize U.S. Cyber Command's current activities under the rubric of layered cyber deterrence. It accepts the

logic of cost imposition, the need for continuous action below the line of armed conflict, and the practical requirement for operating outside of DOD information networks in order to get reliable intelligence on new threats. All of this sits comfortably within the Pentagon's "Defend Forward" posture, which it unveiled in its 2018 Cyber Strategy.

All of this may be confusing for observers who have kept up with the cyber debate. The commission concludes that current efforts should continue in the service of a deterrence strategy, even though those efforts were designed to overcome the weakness of deterrence in cyberspace. The commission deals with this apparent contradiction by arguing that different forms of deterrence operate at different "layers" of competition: forward defenses bolster deterrence by denial by making it harder for adversaries to succeed, and cost imposition bolsters deterrence by punishment if military conflict looms. But these categories overlap in practice. Indeed, "layer 3" includes action both below and above the line of armed conflict, making room for day-to-day competition, deterrence, and warfighting.

Using deterrence as an umbrella category is dubious, because most activities in the digital domain — crime, propaganda, and intelligence gathering — fall outside the realm of deterrence theory. Individuals are relatively tolerant of cyber attacks, making cyberspace a poor venue for coercion. For this reason, a broad national effort based on layered deterrence is bound to fail. There are some areas where deterrence is useful, however. Retaliatory threats to fend off damaging attacks on critical infrastructure are inherently credible. In this case, deterrence makes sense. However, expanding the concept to cover unrelated activities may dilute its usefulness in cases where it is most needed.

In addition to deterrence and persistent engagement, the commission also emphasizes the importance of norms and recommends expanded international engagement. An energized diplomatic effort will enable better and more durable cooperation among like-minded states, easing collective action problems and contributing to stability in cyberspace. Better yet, it will isolate authoritarian states that are on the wrong side of a new normative regime, causing them to think twice about their behavior.

At some point the commission clearly abandoned its original concept. Rather than setting up rival task forces to advocate for distinct approaches, in the style of the original Project Solarium, it merged the recommendations of different task forces operating more or less independently. The final report is not a unified approach to cybersecurity. Instead, it is a laundry list of recommendations. In addition to deterrence, persistent engagement, and norms, the commission recommends efforts to improve defenses and resiliency. It is unclear what, if anything, it rejects.

To implement its recommendations, the commission calls for substantial government reorganization. In an effort to centralize oversight, it calls for the creation of new House and Senate cybersecurity committees. In an effort to improve Congress's understanding of the many issues at stake, it calls for reestablishing the Office of Technology Assessment. Turning to the White House, the commission calls for the creation of a Senate-confirmed national cyber director, who would "serve as the President's principal advisor for cybersecurity and associated emerging technology issues; the lead for national-level coordination for cyber strategy, policy, and defensive cyber operations; and the chief U.S. representative and spokesperson on cybersecurity issues." As the focal point for cybersecurity in the executive branch, this new office would be supported by an Office of the National Cyber Director. Meanwhile, to lead the renewed diplomatic push, the commission calls for a new cyber bureau and assistant secretary at the U.S. Department of State. And to improve resiliency, it calls for a bureau for cyber statistics within the Department of Commerce.

The original Project Solarium adjudicated a debate among competing strategies, under the assumption that resources were finite and tradeoffs were inevitable. It required the task forces to submit a budget alongside every proposal. Such was the case in Eisenhower's White House, which put a premium on sustainable budgets. As the secretary of the Treasury put it, "if we mean to face this Soviet threat over a long time, we must spend less than we now are spending and do less than we now are doing."

The Cyberspace Solarium Commission, by contrast, wants to spend more and do more. It accepts a variety of proposals, even those that seem to be contradictory, and calls for a massive government and private-sector implementation effort. This is necessary because the existence of society as we know it is at stake. The commission invites readers to imagine the worst-case scenario. The report opens with an ominous vision of Washington in the aftermath of a series of cyber attacks:

The water in the Potomac still has that red tint from when the treatment plants upstream were hacked, their automated systems tricked into flushing out the wrong mix of chemicals. By comparison, the water in the Lincoln Memorial Reflecting Pool has a purple glint to it. They've pumped out the floodwaters that covered Washington's low-lying areas after the region's reservoirs were hit in a cascade of sensor hacks. But the surge left behind an oily sludge that will linger for who knows how long. That's what you get from deciding in the 18th century to put your capital city in low-lying swampland and then in the 21st century wiring up all its infrastructure to an insecure network. All around the Mall you can see the black smudges of the delivery drones and air taxis that were remotely hijacked to crash into crowds of innocents like fiery meteors. And in the open spaces and parks beyond, tiny dots of bright colors smear together like some kind of tragic pointillist painting. These are the camping tents and makeshift shelters of the refugees who fled the toxic railroad accident caused by the control system failure in Baltimore.

Cybersecurity analysts may roll their eyes at this scenario, having spent many years answering questions about a "cyber Pearl Harbor." But the commission insists that failure to anticipate the worst would represent a tragic and completely avoidable failure of imagination. The potential for catastrophe rises as government and society become ever more reliant on cyberspace. Mobilizing a whole-of-government and whole-of-society response means reminding everyone of how bad things could get.

The twin themes of coordination and imagination echo the conclusions of the 9/11 Commission Report, which called for a major reorganization of the intelligence community. The 9/11 Commission concluded that while intelligence agencies were independently watching al-Qaeda, they were not effectively coordinating their activities, and they could not imagine the kind of attacks that took place in New York and Washington. The 9/11 Commission included a range of high-profile participants and conducted a high-profile investigation before releasing its final report to great fanfare. It called for a host of changes, most memorably the creation of a director of national intelligence, a cabinet-level position who would serve as the president's chief intelligence advisor and act as the focal point for reform.

The Cyberspace Solarium Commission is much the same. Indeed, it is much closer to the 9/11 Commission than to its Eisenhower-era namesake. While the original Solarium was conducted in secret, the current version has been a highly public affair from the start. And as described above, it quickly jettisoned the notion of analytical competition among rival task forces. It produced not a choice among alternatives but a wish list of reforms, and a call for new legislation, new organizations, and new offices. Above all it stressed the need for coordination and the danger of any lapse in imagination.

Sen. Angus King, the commission's co-chair, made this connection clear at Solarium's launch event. "Our fundamental purpose is to be the 9/11 Commission," he declared, "without 9/11." Rather than

waiting for tragedy, the Cyberspace Solarium Commission imagined an awful future in the absence of serious change. Improving the government's ability to implement good policy requires better coordination, and fewer questions about lines of authority. Hence the national cyber director, an official to whom the president could reliably turn for advice, and someone vested with the power to get things done. As King put it, the president should have "one throat to choke."

Most Americans probably remember the 9/11 Commission fondly, given its effort to put things right after a moment of intense national trauma. But it got a lot wrong. Its theory of the case — that the terrorist attacks occurred because of a lack of coordination and imagination — rested on very thin empirical and theoretical bases. And its practical recommendations were oddly decoupled from its own logic. In particular, it was not clear why a director of national intelligence would improve coordination, given that it would add a new layer of bureaucracy on top of an already sprawling establishment. The tenuous position of the director of national intelligence today should give us all a moment of pause before we try to replicate it to improve cybersecurity.

Some members of Congress are understandably frustrated with the number of organizations and agencies involved in cybersecurity. But that simply reflects the complexity of the domain. Cyber policy touches everything from commerce and communications to technology, regulations, international security, civil liberties, and human rights. The commission correctly notes that government and society are deeply immersed in cyberspace. Oversight and policy will remain complicated and difficult as long as that remains the case. Efforts to streamline cyberspace policy are likely to disappoint for the same reason. The domain may be allergic to the kind of coordination the commission has in mind.

Over the last decade, the government has repeatedly reorganized itself for cyberspace policy. The military, the intelligence community, and the Department of Homeland Security have all created or enlarged existing organizations dedicated to cyberspace. The Department of Defense, the Department of State, and the National Security Council have created new offices and staff to deal with evolving technologies and associated policy issues. Reorganizing again may not streamline matters so much as add new layers of confusion. Perhaps it is best to let these new outfits grow a little. Resisting the congressional impulse to reorganize is a good way to build knowledge and encourage institutional continuity.

I do not mean to criticize the whole report, which contains many fine recommendations. Particularly noteworthy is the commission's effort to look beyond government. "National defense," it rightfully concludes, "takes a very different shape in cyberspace, where the government mainly plays a supporting and enabling role in security and defense and is not the primary actor." The public internet, for example, is a constellation of overlapping networks organized and maintained by a mish-mash of states, firms, individuals, and private sector groups. It cannot function without ongoing voluntary cooperation among these actors, but their interests are not always the same. Rather than demanding that industry supports national security needs as defined in Washington, it opens the door to a more useful ongoing conversation.

The commission also recommends assessing the value of a cyber reserve force that would relax the manpower crunch by allowing more flexible movement between the military and the private sector. Recruiting and retaining skilled personnel is a central challenge for agency heads, who compete with one another and with the private sector for talent. Novel ideas for managing personnel problems deserve attention. The commission also recommends additional investment in professional military education, with an eye towards institutionalizing cyberspace issues across the services. This is important for integrating cyberspace options with conventional military planning, and for dispelling the notion that commanders can treat cyber weapons like munitions they can stockpile and use as needed.

Practical changes like these are unlikely to make the front page, but they offer substantial benefits for day-to-day operations and for long-term contingencies. The Cyberspace Solarium Commission set its sights high, proposing to unify the national approach to cybersecurity policy and suggesting another round of reorganization. The commission's lasting legacy, however, may come from its more modest technocratic ideas.

Joshua Rovner is associate professor in the School of International Service at American University. In 2018 and 2019 he was scholar-in-residence at U.S. Cyber Command and the National Security Agency. He served as a contributing expert for the Cyberspace Solarium Commission. The views here are the author's alone.

<https://warontherocks.com/2020/03/did-the-cyberspace-solarium-commission-live-up-to-its-name/>

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38 North (Washington, D.C.)

IAEA Safeguards in North Korea: Possible Verification Roles and Mandates

By John Carlson

March 16, 2020

Executive Summary

In current circumstances, the possibility of IAEA (International Atomic Energy Agency) engagement in verification in North Korea may seem remote. Negotiations between the United States and North Korea have not progressed, and Kim Jong Un has stated that “if the US persists in its hostile policy toward [North Korea] there will never be denuclearization on the Korean Peninsula.” This statement might sound negative, but it contains an important implication—that the direction taken by North Korea will depend on the actions of the US. This suggests that a resumption of negotiations, if not on the immediate horizon, cannot be ruled out.

The starting point for any agreed process for reducing North Korea's nuclear capabilities and associated infrastructure should be a freeze on the production of fissile material, followed by a commitment to permanently cease these activities and to disable and dismantle the facilities involved through a step-by-step process, with the ultimate objective of denuclearization of the Korean peninsula. This process would include: application of safeguards to all peaceful nuclear activities; progressive rollback of the nuclear arsenal, with fissile materials transferred irreversibly to safeguarded peaceful use or disposal; and verification measures for possible undeclared nuclear activities. The advantage of this process is that confidence and trust can be built progressively in support of each succeeding step.

The approaches set out in this paper to accomplish these tasks may seem unduly complicated, but all parties must recognize that effective verification is absolutely essential to the credibility, and therefore the sustainability, of any negotiating process for North Korea's denuclearization. The IAEA would have the key verification role and full cooperation with its verification activities will be essential to building confidence that the parties to any denuclearization agreements are fulfilling their commitments at every stage of the process. This paper focuses on these activities and the verification role of the IAEA. It reaches the following key judgments:

North Korea's willingness to declare all enrichment and reprocessing facilities, and to negotiate mutually acceptable verification arrangements, is a basic threshold for cooperation and trust, without which any agreement is likely to be short-lived. However, for any future agreement or

agreements with North Korea, the key point for all parties to appreciate is that the IAEA's verification mandate is determined by the terms of the relevant agreements, and can be as wide or as limited as the parties agree.

Pyongyang can be expected to resist the idea of international inspectors having rights of access around the country. However, it might be possible to assuage some of its fears, stressing that the scope of any new safeguards agreements will be limited to what the parties accept in these agreements.

Some intrusive inspections will be required, but exactly what is needed to ensure effective verification will depend on what has to be verified (as set out in the relevant agreement). Under a step-by-step approach, the IAEA and all main actors will have to accept the reality that North Korea will have some nuclear materials and items outside the scope of verification (namely, nuclear materials in the military program), and IAEA inspectors will not have a general mandate to look for all "undeclared" nuclear material and activities.

Continued enrichment operations would become a major issue in the negotiations; thus, if enrichment is agreed to it will be essential to place North Korea's enrichment plant and its low enriched uranium (LEU) product and supporting activities under the most rigorous safeguards. Limits would also have to be agreed upon for the permissible level of enrichment and LEU stocks. If continuation of enrichment is a red line for North Korea, operating enrichment facilities under multilateral arrangements could be considered. A better approach would be to establish multilaterally guaranteed fuel supply arrangements.

Successfully resolving all these issues highlights the importance of establishing the right mandate for the IAEA. In any agreement on safeguards and related verification measures, clarity is essential. Any misunderstandings could be disastrous, potentially resulting in a loss of trust amongst the parties, the collapse of the agreement and a long and difficult path to reaching any further agreement. Consequently, it is imperative to set out precisely the rights and obligations of North Korea and the IAEA, to ensure that the expectations of the parties correspond, and to define precise verification objectives to ensure there is a shared understanding of what these objectives involve.

<https://www.38north.org/reports/2020/03/jcarlson031620/>

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Defense News (Washington, D.C.)

America's Bomber Force Is Too Small and Getting Smaller

By Gen. John Michael Loh (ret.)

March 12, 2020

America's bomber force is now in crisis. In the Air Force's fiscal 2021 budget request, one-third of the B-1 fleet is set for retirement, B-2 survivability modernization is canceled and the new B-21 is at least a decade away from contributing significantly to the bomber force. The venerable B-52 requires new engines and other upgrades to be effective. The number of bombers are at their lowest ever, but demand for bombers increases every year, particularly in the vast and most-stressed region of the Indo-Pacific. Bombers are the preferred weapon system there because of their long range and huge payload capacity.

At the end of the Cold War in 1989 and just prior to the Gulf War in 1990, America had over 400 bombers. After these proposed cuts, there will be only 140.

This decline is curious in light of recent Air Force declarations and testimony before Congress. In the document “The Air Force We Need,” Air Force leaders insisted last fall they need five more bomber squadrons — about 65 more bombers. Just last month, the Air Force chief of staff testified that the need is for “200 bombers, of which 145 would be B-21s.” These numbers have been validated by think tanks such as MITRE Corp., the Center for Strategic and Budgetary Assessments, Rand, and the Mitchell Institute.

In today’s global threat picture, bombers become the coin of the realm. Bombers have dual strategic roles. They provide flexible deterrence with their nuclear capability, forcing adversaries to think twice before starting an attack. Bombers also carry the brunt of conventional operations.

In our wars in the Middle East, the B-1s, B-2s and B-52s have all played central roles attacking fixed targets and in close-air support of ground troops. Their long range and on-station times, combined with huge weapons loads, make them the weapon of choice for combatant commanders in both the Middle East and Pacific regions.

A single B-2 can carry and launch 80 precision-guided weapons, each assigned a different target, and can penetrate contested airspace. The B-1s and the B-52s have similar direct-attack capabilities plus the ability to carry and launch cruise missiles from standoff ranges. No other weapon system, in the air or on the sea, can come close to this massive firepower.

The need for more bombers is increasing. Whether facing nonstate actors like ISIS, mid-tier threats like North Korea and Iran, or peer threats such as China and Russia, the ability to strike targets quickly and in large numbers is crucial. This flexibility was vividly demonstrated in the first three months of Operation Enduring Freedom after 9/11. Bombers flew 20 percent of all sorties, but dropped 76 percent of the munition tonnage. Despite those who thought bombers were only useful in long-range nuclear or strategic missions, the reality is that a wide variety of combat missions are simply impossible to execute without bombers.

But bombers and their crews are worn thin. The Air Force bought 100 B-1s in the 1980s. When demand for them surged post 9/11, the Air Force retired 30 B-1s to free up funding to sustain the remaining force. This, combined with earlier divestitures, saw the Air Force fly 61 B-1s relentlessly for nearly 20 years. The fleet was in such bad shape in 2019 that mission-capability rates were less than 10 percent. The Air Force’s request to retire a further 17 B-1s to boost the health of the remaining fleet looks like a repeat of the last B-1 retirements.

Among the 140 bombers that remain, only the 20 stealthy B-2s have the ability to penetrate modern air defenses to strike critical targets — a priority of the National Defense Strategy. Yet the FY21 budget request cancels the B-2’s Defensive Management System Modernization program and puts our only operational stealth bomber on a path to early retirement. Given the unmet demand for penetrating platforms and the time it will take for the B-21 to be delivered in numbers, halting modernization of the 20 stealth bombers we have today is risky.

Finally, the 78 B-52Hs are planned to be re-engined in the years ahead. New, fuel-efficient and more reliable engines should increase their life and capability. The ultimate cost of this modification is not known. One of the unknowns is the extent of corrosive structural and wiring problems that will inevitably emerge when each B-52 is unbuttoned.

Discovery of such problems is not new. When the Air Force upgraded its C-5M fleet with new engines, the Air Force had to retire the older C-5A fleet to pay for unknown repairs. Even if the B-52 re-engining goes smoothly, a significant portion of the force will be unavailable as each moves through the depot for modifications.

Last year Congress increased funding for the F-35 fighter and added funds for unrequested F-15EX procurement. Now is the time for Congress to restore funding for existing bombers to avoid this shortfall in a most vital component of our nation's defense.

The Air Force entered the new decade with the smallest bomber force in its history, and the FY21 budget request erodes it further. There comes a point where doing more with less does not work, especially with B-21s not available in numbers for several years. It is time to recognize the gravity of the situation and build up the nation's bomber force. A good "plan B" does not exist without bombers.

Gen. John Michael Loh is a former U.S. Air Force vice chief of staff and had served as the commander of Air Combat Command.

<https://www.defensenews.com/opinion/commentary/2020/03/12/americas-bomber-force-is-too-small-and-getting-smaller/>

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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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