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At the present time, the U.S. land-based ballistic missile force (ICBMs) consists of 400 landbased Minuteman III ICBMs, each deployed with one warhead, spread among a total of 450 operational launchers. This force is consistent with the New START Treaty. The Air Force has modernized the Minuteman missiles, replacing and upgrading their rocket motors, guidance systems, and other components, so that they can remain in the force through 2030. It has initiated a program to replace the missiles with a new Ground-based Strategic Deterrent around 2029.

The U.S. ballistic missile submarine fleet currently consists of 14 Trident submarines. Each can carry 20 Trident II (D-5) missiles—a reduction from 24 missiles per submarine—with the total meeting the launcher limits in the New START Treaty. The Navy converted 4 of the original 18 Trident submarines to carry nonnuclear cruise missiles. Nine of the submarines are deployed in the Pacific Ocean and five are in the Atlantic. The Navy also has undertaken efforts to extend the life of the missiles and warheads so that they and the submarines can remain in the fleet past 2020. It has designed and is beginning production of the new Columbia class submarine that will replace the existing fleet beginning in 2031.

The U.S. fleet of heavy bombers includes 20 B-2 bombers and 40 nuclear-capable B-52 bombers. The B-1 bomber is no longer equipped for nuclear missions. This fleet of 60 nuclear-capable aircraft is consistent with the U.S. obligations under New START. The Air Force has begun to retire the nuclear-armed cruise missiles carried by B-52 bombers, leaving only about half the B52 fleet equipped to carry nuclear weapons. The Air Force plans to procure both a new long-range bomber, known as the B-21, and a new long-range standoff (LRSO) cruise missile during the 2020s. DOE is also modifying and extending the life of the B61 bomb carried on B-2 bombers and fighter aircraft and the W80 warhead for cruise missiles.

The Obama Administration completed a review of the size and structure of the U.S. nuclear force, and a review of U.S. nuclear employment policy, in June 2013. This review advised the force structure that the United States has deployed under the New START Treaty. The Trump Administration completed its review of U.S. nuclear forces in February 2018, and reaffirmed the basic contours of the current U.S. force structure and the ongoing modernization programs. The Trump Administration has also funded development of a new low-yield warhead for deployment on Trident II (D-5) missiles. Congress will review the Administration’s plans for U.S. strategic nuclear forces during the annual authorization and appropriations process, and as it assesses the costs of these plans in the current fiscal environment.

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NUCLEAR WEAPONS AND DETERRENCE

Military Strategy Magazine

Nuclear Strategy – A Tale of Consequence

By Colin S. Gray

Nuclear strategy

It is tempting, perhaps seductive even, to believe that the awful innovation of the nuclear weapon comprises the real authority in the concept and the physical reality under discussion here. However, in time this belief is near certain to be proved incorrect. It is even possible that weapons development has attained an ironic near perfection of form, or at least effectively such, in the widening gyre of nuclear weapons seemingly of all dimensions and many specialized purposes; at least if we take as authoritative what the Russians are telling both themselves and us these days. Without necessarily doubting Russian sincerity about their technical military-nuclear prowess, however, there is ample ground for doubt concerning the strategic sense in the past decade of Vladimir Putin's apparently nuclear-bent military achievements. The beginning of wisdom for us needs to be an urgent return to theoretical, conceptual basics. In the rather dubious team-like twinning of nuclear and strategy, it is really important not to allow oneself to become confused as to the relative significance of the noun and the adjective. It may well be that the nuclear weapon is certain to remain a permanent menace to the human race and our whole adventure in statecraft and its ancillary strategy, but I find such an attitude to be historically less than satisfying, true though it would appear to be from our current, but necessarily temporally limited perspective. I am not, at least not quite, saying that given time even the great nuclear revolution of the Twentieth Century will age into irrelevance, though I suspect it will be found less helpful in the future than it was for the half century following World War II. The principal reason why this is likely to be so will be readily locatable in what functions as the 'bible' of our subject, if, for once, in this instance I may be excused the exceptional irreverence in this instance. It is advisable, indeed necessary to turn to the pages of *On War* (of course), somewhat aware of the apparently permanent truth in Clausewitz. Also, we should be ready enough to understand and by and large accept reasonable evidence-based argument covering the whole unduly exciting passage of modern statecraft and strategy since his death in 1831.[i] The dominant argument in *On War* is to the effect that war must always be about politics. When this condition appears not to be authoritative, the use of force must be about some other condition or quality, though even that will likely have political meaning. Clausewitz theorized both about very great warfare and also small. We cannot know what sense, if any, he would have made of nuclear weapons for strategy, but he bequeathed the skeleton, at least, of one which remains relevant even for today. By far the most important argument in *On War* holds, then as now, that political purpose must always strive hard to control events.[ii] The great Prussian understood all too well that war and its warfare is an uncertain enterprise, and he witnessed and survived the appalling phenomenon of war as a gamble that may not pay out as it might.[iii] Indeed almost certainly he would have endorsed the characterization of war as chaos, the preferred 'call sign' of the outstanding U.S. Marines' general, James Mattis. It shouldn't have escaped the notice of readers of these pages of *Military Strategy* that our core topic here, nuclear strategy, is likely to prove notably unfriendly to the idea that warfare is a gamble. Nuclear warfare could be a product of policy error and prove to approximate more closely Jim Mattis' understanding of 'chaos,' than any recognizable semblance of an orderly plan. It is necessary to mention that even where orderly and apparently well prosecuted military plans are carried into action, war seems to have multiple ways to avoid discipline. Is it likely, we certainly should ask, that actual warfare with nuclear weapons would prove a different story to the entire grim machine of known history? – I suspect not, rather

do I suspect that nuclear warfare today would resemble a larger and more consequential narrative than we have more than adequate grounds to suspect would be the most probable case, were any of us to survive such a catastrophe. However, all may not be lost, despite serious grounds for occasional doubt to the contrary.

Strategic Common Sense

We need never to forget that the true meaning of strategy is consequence.[iv] Nuclear strategy is all about the consequences of tactical and operational choice with respect to the threat or use of nuclear weapons. Excellent seeming theoretical reasoning is critically and rather desperately short of empirical support. What, after all, do we really know about the military value of nuclear weapons as enforcers of political choices? Fundamentally, what do we think we know about both the threat and the actual use in war of these weapons? We may be tempted by the attractive promise of what could be understood, not unreasonably, as a pre-emptive surrender of strategy and statecraft by an adversary polity. However, we could not reasonably anticipate such a rational, almost moral, collapse on the part of an enemy. The political pressure to stand firm, at least briefly perhaps, would, very much sooner than later, fuel argument for holding the line and the like. Although the war machinery of a nuclear armed state will be the product of thousands, decisions to fight, or not, will always be the product of a very small number of people. Nineteenth Century Europe invented the practice of defense preparation in peacetime for the occasion of war. This phenomenon we have come to accept simply as strategic commonsense – we will be ready contingently for whatever security hazards erupt in the near future. This simply is prudent. All too easily understood, of course, we pay a price that could prove heavy indeed, in defense readiness. Prudent defense preparation might, quite easily, though inadvertently, assume a menacing character in the understanding of other states, with consequences in political choice that could be seriously adverse for the security of all interested parties, including ourselves.

Nuclear strategy in common with all strategy, is the result of notably human intentions and personal choice. Given the devastating consequences that must follow from the use of nuclear weapons, it is unlikely that unilateral advantage could be secured from their use. Probably, the politically more relevant question pertains to the sheer nerve of policymakers and strategists. Even if we were persuaded that a war might be won, which is to say conducted to a point where significant political advantage would be gained, the nuclear element in the judgment must dampen confidence in any conclusions as to policy. Of course, we could not turn to strategic commonsense for prudent guidance in such a situation, because intelligent statecraft ought not to have been in the dire condition that it was, repeatedly, in the truly dreadful Twentieth Century, now mercifully concluded. Arguably it is somewhat ironic that our nuclear evil is the product of a danger in scientific discovery and exploitation about which we did not know, indeed truly could not have known. Though with mobilization and readiness times suitably adjusted, readers of this journal must notice that even though some flexibility in the mobilization, subsequent deployment and indeed use of nuclear forces on both sides is highly likely in principle, in practice nuclear crisis and war itself might well resemble 1914 rather closely. It may be prudent and just possibly militarily sensible to wage nuclear warfare only slowly and at a relatively low level of explosive possibility, but we cannot ignore the vital matter of critical context. Austro-Hungary, vitally assisted by Russian folly, created what became the near ‘perfect storm’ for statecraft that was Summer 1914.[v] Appalling though that certainly transpired to be, at least to become, it pales into near insignificance when it is compared with the possible, indeed probable, consequences of a truly strategic political crisis in the present or the future. Is there a modest seeming city in Eastern Europe, on the Baltic flank of NATO, just waiting to have its very own Sarajevo moment?[vi]

So, What Do We Do?

Over the course of the past decade the geophysically much reduced Russia of Vladimir Putin has sought some compensation in very high-end technology for the embarrassingly shrunken national geography and size of population. Of particular interest is the achievement of notable military success in ways that should help remarkably the vulnerability that was felt as a consequence of the great territorial and populous shrinkage effected under Mikhail Gorbachev.

It is no exaggeration to argue that contemporary Russia has enhanced greatly its military attachment to nuclear weapons. These have been accepted by the Russian military on a scale and with an apparent enthusiasm entirely alien to NATO. On the shallow evidence of words uttered, exercises conducted, and deployments apparently sometimes mobilized, the Russian armed forces of today and tomorrow are preparing for, indeed anticipating virtually all military activity to be conducted in an actively nuclear environment. Rather ironically, this shift towards nuclear dependency may well largely be the regretted consequence of a process of internationally competitive and generally technically successful arms procurement.

In an endeavour to prove some relevant, credible, and feasible answer to the fundamental question posed as the title for this section, I have selected seven items of political, indeed strategic, advice to take from this analysis. These are selected and chosen admittedly very much from a NATO perspective looking East. I have chosen these magnificent seven nuggets of political and indeed strategic advice according to the dominant need for depth and breadth of analysis.

Nuclear strategy must be considered a political subject to an even greater degree than is required of strategy in all other contexts. Especially in regard to prospective nuclear matters, it is likely that the issue of political meaning may fall by the wayside and be all but lost to the force of relatively unfamiliar perils. It would be essentially important not to allow reasonable nuclear anxiety to overwhelm otherwise sensible policy and its politics.

It will be essential that Putin (indeed any Russian leader, or group) should be denied any credible sense of victory, political or strategic. There is plenty in Russian culture of both recent or distant vintage that feeds on our hopes that the partial Russian revival under the guise of a new surrogate Czar would be moved by self-interest to generosity in the course and particularly the consequences of nuclear happenings. Bearing in mind the dangers of some negligence, it will be necessary for a NATO still 'in the field' able and willing to resist, strategically to deny Moscow the policy and to be careful to deny Russia the conviction she actually had 'won' in actual warfare.

Russia's opponents (i.e. NATO) should be restrained in their public political enthusiasm for peace. Adaptively this could prove a 'killer' element in a likely weapon, and use control agreement that might have some political traction for a possible settlement. The toxic combination of popular democracy and nuclear menace expressed in provocative style do not comprise a combination in which any confidence could be placed; it would not constitute a promising opening for a textbook on statecraft and strategy, let alone strategy and diplomacy.

The conduct of conventional warfare, local or general in character must not be so executed as to come to risk compromising the mission integrity of so-called strategic forces. Probably above all else it is essential that neither Russia nor anyone else attains a truly competitive position in active warfare that could well tempt a bid for genuine nuclear dominance. The evident contemporary Russian enthusiasm for nuclear escalation in the event of conventional setback should be brutally and convincingly rebuffed unarguably, both by the deployment of suitably relatively low-yield weapons and also by convincing doctrinal argument about the mission integrity of strategic forces.

Nuclear operations against Russia in time of war ought to be conducted with great care to avoid needless intrusion into Chinese space, politically understood. It has to be expected that a nuclear exchange (or two) between Russia and NATO could hardly help but alarm Beijing, assuming, of

course, that they had not secretly pre-arranged the military episode(s) at issue. A temptation to deal with the Chinese nuclear menace under the cover provided by a nuclear war with Russia that begins in Europe, should be prudently resisted as needlessly dangerous in a context that already might be more perilous than any of our politicians and soldiers have ever confronted before.

As Imperial Germany demonstrated quite conclusively in 1918, it can be exceptionally difficult to hold public opinion resolute in the face of obvious and undeniable setbacks (e.g. defeated soldiers returning home). It would be unusually challenging to endeavour to persuade the wartime public (such as survive the initial round!) that any political outcome whatever would be advantageous when contrasted with a political settlement of almost any other character. Apparently robust domestic opinion may not be resilient in the face of severe and unanticipated military setbacks. It is hard even to imagine what a 'good news' story about nuclear war would look like!

In the design and prospectively the execution of NATO's nuclear policy and strategy it is truly vital to remember the deep, indeed the truly cultural attachment of Russians to the concept, as well as the reality of national physical geography. Modern Russia exists, and has survived because of this geography. No other polity has a geopolitical history at all like the Russian. While there is great strength in this geography, there is also potentially considerable vulnerability that NATO could and should plan to exploit in a case of severe strategic necessity.

Conclusion

If truth be told, as it must be here, no-one knows how to conduct a nuclear war, prudently or otherwise. It is probably not helpful to remind readers that when von Trupp reached the Marne in 1914, and indeed even when Rommel crossed the Meuse at Sedan on April 12-13, 1940, they did not and could not know whither the dynamics of war would take them. What matters above all else is that we all, especially our military planners, never forget that a decision to wage war is ALWAYS A GAMBLE and the historical record does not demonstrate that bold decisions for war initiation typically are rewarded with conspicuous success.[vii]

The hazards of nuclear strategy are too obvious to require emphasis; but a few facts of international strategic life do need recognition. It is important for the United States to be able to determine more closely the kind of strategic crimes that could be perpetrated. Ideas are needed for conceptual guidance in nuclear targeting; no matter how disagreeable this may be, there really is no responsible alternative. If a nuclear war has to be waged, its conduct must be led by intelligent choices. Virtually no matter what the strategic circumstances would be, it is hard to imagine a context wherein American targeting choice would not matter. At the very least the United States must always be better served by purposeful targeting preferences rather than apparently near random strikes. Even if we are pessimistic about the relative value of the outcome, it should always be worth trying to secure an improved result.

Formidably challenging though the problems of nuclear strategy certainly are, there is at least one approach to the difficulties raised by nuclear strategy that can help us significantly if we employ it ruthlessly. I suggest that the whole complex subject of nuclear strategy should be organized in our minds, plans, and even our action, as a three-part problem. We can, and ought, to reduce nuclear strategy quite rigorously, to a 3-part problem or challenge and we need to exercise a conceptual discipline in order to deny the truly awesome physical possibilities undue authority over our thought and behaviour. Both at its core and in its core nuclear strategy comprises but three conceptually imperial ideas: war prevention, military action, and – most potently of all – consequences. These three contexts, pre-war, wartime, and post-war, capture the entirety of our subject.

It should come as no surprise for us to appreciate the third subject category, pertaining to the consequences of nuclear warfare, is the one of most important consequence. The consequential context of nuclear war would be extremely likely to dwarf in its significance the behaviour conducted both before and during a nuclear war. Probably it is valid to claim that thought and action about the possible, indeed the probable, context of actual nuclear warfare has nearly always focussed very understandably upon the challenge of war prevention, scarcely at all upon the difficulties near certain to follow as a consequence of actual nuclear use.

My suggestion in this article simultaneously to reduce our focus of concern to just three, war prevention, nuclear warfare itself, and post-war consequences, should encourage interest in the high, even supreme, importance of what I choose to consider the context of (future) consequences. The insistence here upon recognition of the conceptual, indeed the temporal also, unity of the subject of nuclear strategy should help people realize that (nuclear) crisis, warfare, and aftermath truly comprise a subject with a single, nuclear, narrative.

References

[i] Carl von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1976), especially p.81.

[ii] *Ibid.* That war of any kind must be regarded as an event pregnant with political meaning, was the core belief that underpinned, indeed provided, the meaning, to all the phenomena of which Clausewitz wrote.

[iii] The idea that war is really a gamble has failed to attract the attention it merits.

[iv] This idea is advanced and explored in my *Theory of Strategy*, (Oxford: Oxford University Press, 2018), pp. 61-4).

[v] See Lukas Milevski, *The West's East: Contemporary Baltic Defense in Strategic Perspective* (New York: Oxford University Press, 2018).

[vi] For an exceptionally fine study of the principal military events of 1914 and then of the campaign consequential from it, see Holger H. Herwig, *The Marne 1914: The Opening of World War I and the Battle that Changed the World* (New York: Random House, 2009).

[vii] For two excellent recent, albeit very different studies of the US challenge regarding nuclear weapons, see US Department of Defense, Office of the Secretary of Defense, *Nuclear Posture Review*, February 2018 (Washington, DC, USGPO, 2018); and Matthew Kroenig, *The Logic of American Nuclear Strategy: Why Strategic Superiority Matters* (Oxford University Press, 2018)

<https://www.militarystrategymagazine.com/article/nuclear-strategy-a-tale-of-consequence/>

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Defense News (Washington, D.C.)

Russia Slams US Arguments for Low-yield Nukes

By Associated Press

April 29, 2020

MOSCOW — The Russian Foreign Ministry on Wednesday rejected U.S. arguments for fielding low-yield nuclear warheads, warning that an attempt to use such weapons against Russia would trigger an all-out nuclear retaliation.

The U.S. State Department argued in a paper released last week that fitting the low-yield nuclear warheads to submarine-launched ballistic missiles would help counter potential new threats from Russia and China. It charged that Moscow in particular was pondering the use of non-strategic nuclear weapons as a way of coercion in a limited conflict — an assertion that Russia has repeatedly denied.

The State Department noted that the new supplemental warhead “reduces the risk of nuclear war by reinforcing extended deterrence and assurance.”

The Russian Foreign Ministry sees it otherwise.

The ministry’s spokeswoman, Maria Zakharova, commented on the State Department’s paper at a briefing on Wednesday, emphasizing that the U.S. shouldn’t view its new low-yield warheads as a flexible tool that could help avert an all-out nuclear conflict with Russia.

“Any attack involving a U.S. submarine-launched ballistic missile (SLBM), regardless of its weapon specifications, would be perceived as a nuclear aggression,” Zakharova said. “Those who like to theorize about the flexibility of American nuclear potential must understand that in line with the Russian military doctrine such actions are seen as warranting retaliatory use of nuclear weapons by Russia.”

Zakharova cast the U.S. deployment of low-yield warheads as a destabilizing move that would result in “lowering the nuclear threshold.”

U.S.-Russian differences on nuclear arms issues come as relations between Moscow and Washington are at post-Cold War lows over the Ukrainian crisis and the accusations of Russian meddling in the U.S. 2016 presidential election.

Last year, both Moscow and Washington withdrew from the 1987 Intermediate-range Nuclear Forces Treaty.

The only U.S.-Russian nuclear arms control agreement still standing is the New START treaty, which was signed in 2010 by U.S. President Barack Obama and then-Russian President Dmitry Medvedev. The pact limits each country to no more than 1,550 deployed nuclear warheads and 700 deployed missiles and bombers and envisages sweeping on-site inspections to verify the compliance.

Russia has offered to extend the New START that expires in February 2021, while the Trump administration has pushed for a new arms control pact that would also include China. Moscow has described that idea as unfeasible, pointing at Beijing’s refusal to negotiate any deal that would reduce its much smaller nuclear arsenal.

In a statement Wednesday marking the 10th anniversary of signing the New START, the Russian Foreign Ministry hailed the treaty as an instrument that helps ensure predictability in the nuclear sphere and reaffirmed Moscow’s offer to extend it without any preconditions.

<https://www.defensenews.com/smr/nuclear-arsenal/2020/04/29/russia-slams-us-arguments-for-low-yield-nukes/>

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Defense News (Washington, D.C.)

DoD's Border Wall Funding Shift Hits Russia Deterrence Efforts

By Joe Gould

April 28, 2020

WASHINGTON — The Pentagon is moving to scuttle nearly 19 more military construction projects — including \$274 million worth in Europe to deter Russia — as a means to backfill a number of building projects at home that were deferred to pay for President Donald Trump's border wall.

Defense Secretary Mark Esper directed the moves in a memo Monday to acting Pentagon Comptroller Elaine McCusker, which was obtained by Defense News. Overall, Esper plans to reshuffle \$545.5 million in the department's construction budget.

The funding shifts detailed Tuesday would deal a particular blow to efforts to deter Russia in Europe, where roughly \$1 billion in planned projects stand to lose funding to pay for the southern border wall. Those projects include infrastructure for military aircraft, fuel and munitions storage through the European Deterrence Initiative.

Key House Democrats ripped the Trump administration for partially backfilling canceled military construction projects to build his "wasteful" border wall. House Appropriations Committee Chairwoman Nita Lowey, D-N.Y., and Military Construction and Veterans Affairs Subcommittee Chair Debbie Wasserman Schultz, D-Fla., called it, "an end run around Congress."

"Even worse, Trump is doing this by canceling funding for critical European Deterrence Initiative projects that were designed to bolster real national security needs and prevent Russian aggression against American allies and partners in Europe," they said in a joint statement Tuesday.

"Once again, the Trump Administration is putting domestic political considerations ahead of national security, and Trump is trampling on Congress' power of the purse in the process. The American people deserve better, but they will only get it when Congressional Republicans join us and stand up to this out-of-control President."

The latest plan would move 2021 funding for projects in places like Texas and Guantanamo Bay, but also Spain, Norway, Germany, Jordan, Japan and the Kwajalein Atoll, so that the Pentagon restart 22 projects in 17 states that had been defunded.

When Esper in September approved the diversion of \$3.6 billion from 127 military construction projects to pay for barriers and fences in Texas, Arizona and California, he suggested European allies could help replenish \$771 million for 40 projects across Europe.

The Pentagon has maintained all the affected projects are "deferred," but Congress would have had to backfill the funding. In his memo on Monday, Esper said his new funding shifts would enable the execution of projects scheduled for contract awards this calendar year and would "ensure adequate funding remains available" for border wall projects.

The latest move comes as a federal appeals court in Washington on Tuesday began considering the Trump administration's decision to use billions of dollars more than Congress intended by declaring the U.S.-Mexico border an emergency the Defense Department should handle.

Democrats and some Republicans have fiercely rejected the move as a power grab by the executive branch.

Among big projects being restarted, the U.S. Army Military Academy at West Point, New York, would now see \$95 million for an engineering center and \$65 million for a parking structure. The

others ran the gamut from training ranges to medical facilities and a \$63 million middle school at Fort Campbell, Kentucky.

The economic fallout from the coronavirus pandemic has only intensified the value of military construction to local communities.

“This will certainly be welcome news to the bases and communities that are being taken off the cut list because it will help inject money into local communities to help with the economic recovery later this year,” said Todd Harrison, a budget analyst with the Center for Strategic and International Studies think tank.

“But for members of Congress and others that objected to the use of DoD MILCON funds for construction of the border wall, this doesn’t change much — the same amount of funding is being diverted, just from different sources,” he added.

More than 20 projects worth \$538.4 million remain deferred, including an \$85 million project at Holloman Air Force Base, New Mexico, to construct a new operations facility for an MQ-9 UAV formal training unit.

The next largest project still on hold is a \$58 million Coast Guard pier and maintenance facility at U.S. Naval Base Kitsap in Washington state.

Aaron Mehta and Valerie Insinna contributed to this report.

<https://www.defensenews.com/congress/2020/04/28/dod-border-wall-funding-shift-hits-european-deterrence/>

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Air Force Magazine (Arlington, Va.)

Q&A: Right-Sizing Bombers and People

By John A. Tirpak

May 1, 2020

Gen. Timothy Ray is the commander of Air Force Global Strike Command and the Air Forces Strategic component commander for USSTRATCOM. He directs the Air Force’s three bomber fleets, its land-based Intercontinental Ballistic Missiles (ICBMs) force, and the nuclear command, control, and communications enterprise. He spoke exclusively to Air Force Magazine Editorial Director John A. Tirpak on March 31 about the evolving bomber force, AFGSC end strength, the changing nature of deterrence, and future weapons. The conversation has been edited for length and clarity.

Q. You’ve said the Air Force will need more than 100 new B-21 bombers. Is the final number coming more into focus?

A. I’m very comfortable with where the B-21 program is, writ large, and we’ve said publicly that we think we need 220 bombers overall—75 B-52s and the rest B-21s, longterm.

The size of the bomber force is driven by the conventional requirement, and then we manage the nuclear piece inside of that, based on treaty and policy. In the context of the National Defense Strategy (NDS) and great power competition, 220 is where we think we need to go.

Those 75 modernized B-52s, ... that’s not a simple set of modifications, but we think we have a plan going forward. It will feature a bridging mechanism to keep the B-1 fleet viable and—where

needed—modernized, to get us through that gap. It features keeping the B-2 viable until we know we've got enough penetrating capability with the B-21.

There's a lot of things that have to happen between now and, I would say, five years from now, to begin setting a path beyond 175. I won't call it aspirational; I think it's a realistic assessment of what we think we need to do. I don't think that even my replacement will make a decision on that. I think it's two commanders from now who will really determine the exact path on the bomber roadmap to take us past 175.

Q. The Air Force has asked to take some B-1s out of service to help pay for Joint All-Domain Command and Control (JADC2). Can you fulfill the NDS with what's left?

A. If we right-size the B-1 fleet, based on what I think we can sustain, and if we make some structural and capability modifications. ... My goal would be to bring on at least a squadron's worth of airplanes modified with external pylons, to carry the [Air-Launched Rapid Response Weapon, or ARRW] hypersonic cruise missile.

Some B-1s need significant structural work, so if we limit that liability, then we can do smart things, and we've got support from Congress to do this.

All aspects of long-range precision strike absolutely depend on a viable Space Force. That has to happen. Anyone who wants to do long-range precision strike in the future, they can't be serious about it unless they're fully partnered on all-domain command and control and the Advanced Battle Management System (ABMS).

Q. Did you request money for hypersonic weapon pylons in the 2021 budget?

A. No, that's not in the current budget, that's a project we're working on. There are several versions that we could contemplate, but we believe the easiest, fastest, and probably most effective in the short-term will be to go with the external pylons. And as we move toward the ARRW, that is a good weapon/airframe and configuration match to get us quickly into that game.

Q. Would you commit to the ARRW?

A. I think we're going to commit to the ARRW, because I think our carriage capability is good for that. With some mods, we may be able to increase the B-52 carriage but, really, the ability for the B-1 to take up hypersonic testing takes a load off the B-52 for the engines, the radar ... and there's a good number of communications upgrades I need to make.

We actually have a very aggressive game plan, here, over the next three to five years. We'll have to commit more aircraft and maintainers and operators to test. Typically, we have two bombers at Edwards [Air Force Base, Calif.]; we're going to ramp up to eight.

Q. Do you think you'll need a conventional version of the Long-Range Standoff weapon (LRSO), along the lines of the Conventional Air-Launched Cruise Missile (CALCM)?

A. First things first. The ALCM is aging out on us. I pulled alert in the old days of [Strategic Air Command] SAC with ALCM, and I've shot CALCMs in anger. The utility of those is unquestionable. We've got to replace the ALCM.

Realize that everything we do will be driven inside of a treaty context. I'm pleased with the thinking and approach in the LRSO program; I think that's going to be a very good missile. If we needed a conventional cruise missile in a hurry, with even longer range than the [Joint Air-to-Surface Standoff, Extended Range], I would start there, with the LRSO.

I'm not asking for it, because I've got to solve the nuclear version first. But as opportunities present themselves down the road, LRSO certainly has some attractive features and capabilities for a conventional cruise missile.

Q. When you talk to Congress about strategic modernization, do you get the sense that everybody's on board? What do the unconvinced need to hear?

A. I think the awesome part of democracy is that we debate the issue. It's always healthy to question what you're doing to make sure you're doing the right thing.

The context in which we view the nuclear triad is important, and we can't pick the context. It has to be viewed in the context of the now-existing Chinese triad, and a fully modernized and augmented Russian triad. And absolutely, in the minds of our partners and allies, to whom we've promised protection—so they don't have to go down the path of a nuclear program.

That's the very clear reality of where we are. And when you explain things that way, it becomes an easier way to understand the problem.

We have had significant reductions in the number of nuclear weapons in the past, and we've done it through treaty. My advice and counsel was, 'you're going to have to continue down the path until you've got a change in the world, and it has to be done in a multilateral fashion'.

Q. Russia has heavily modernized its strategic weapons. Has that fundamentally changed deterrence?

A. The biggest change is the number of players on the field, and our ability to manage multiple problems at one time.

I think the triad concept remains very firmly intact. The number of ICBMs creates very significant challenges for anybody who would attack us, they would need to use a very high number of weapons. ... Our ability to strike back keeps the bar very high. The [Sea-Launched Ballistic Missile submarine] fleet is very survivable, and certainly has the visibly flexible deterrent of a bomber and its ability to go in multiple places and shoot from multiple axes.

We're going to have to continue to think about the command and control viability, and how we keep space very clearly in the middle of all these conversations. But I don't see that, broadly, deterrence has changed.

Q. You'll need an aggressive schedule of convoys when you replace Minuteman with the Ground-Based Strategic Deterrent (GBSD). Will you have enough manpower, and the new helicopter in hand, in time to do that?

A. I believe so. We've done this before with Minuteman and Peacekeeper, so it's not a new thing. But when we designed the GBSD, it is a single weapon system, now, and not simply the silo and the launch-control facility. It's an integrated capability. And we think that will give us a far more secure, far more reliable, and easy-to-upgrade system.

Right now, we think there will be a two-thirds reduction in the number of convoys and the amount of times we have to open the silos. We're working with the local communities and states on some of that thinking.

Q. The bomber roadmap of a couple of years ago said AFGSC would have to live within a certain end strength, and it couldn't add systems without getting rid of some. The "Air Force We Need" analysis, though, called for more bomber squadrons. Will your manpower go up, or down?

A. When the B-21, GBSD, new helicopter, and new cruise missile are all bedded down, the goal for the command is to actually have fewer people. For example, you go from a four-person B-1 crew to a B-21 with a two-person crew, right? With GBSD, there will also be fewer people involved.

Broadly, we can't just keep throwing manpower at these things, we have to be really smart about that. Our goal is a net reduction in manpower. I think that's the right thing to do for the taxpayer and for the force.

Q. So, after a few years, you would expect to start reducing manpower?

A. You'll probably have to grow a little bit before getting smaller. You're going to go from three [to] four bomber fleets to get to two. You have to work through weapons generation facilities, training pipelines, etc. We know where we want to be, roughly, and we know where we are, and it will be a very interesting path to work through the next three to five years to get certainty on that.

Q. The Army's new Long-Range Precision Fires program is aimed at a lot of the target sets that have traditionally been the purview of the Air Force. Is a roles and missions debate brewing?

A. I don't believe a roles and missions conversation is really the smart path forward. I believe we all recognize and acknowledge the need for long-range precision strike. Again, I underscore, ABMS and JADC2 are the entering argument, and why we're leading that effort for the joint force and why the SecDef and the Chairman [of the Joint Chiefs of Staff] look to us to do that.

I believe that [the Army is] not really looking to shoot at ranges fundamentally different than what we could with the [hypersonic] weapon, but we add several thousand miles to the launch point. So, I wouldn't get into, there has to be the right this-and-that. None of it matters unless we get JADC2 and ABMS and space right.

What we bring differently from them is, I can shoot from anywhere on the planet. A ground force will have limitations. I wouldn't say that's not necessary, but they don't have the universal access that we will from the air side. So, I think there's a clear advantage to having that in the arsenal, but to choose between that or the long-range strike, I don't think is the right informed debate.

Q. Is it settled that the arsenal plane will be the B-52? Or is the aperture open to looking at other kinds of platforms?

A. The aperture is still open to looking at better ideas—and more ideas.

I believe we should really press into that. You like to have multiple ways to get to the right long-range strike volume. And if you can find a more affordable path, then we should look at that.

The way we do acquisition, we usually buy a platform and keep it for a long period of time. I think there's value to the Century Series approach, where we buy an aircraft, we pay for the design, but we don't pay to sustain it for 30 to 40 years. We pay to keep it for a little while because technology is moving so quickly.

Q. How do you think that concept will work in AFGSC?

A. I think we're going to continue to ask industry, can you do something where I only buy a small number, and I only fly it for 10 years? But I've got to have the conversation about price point and where that return on investment is. So, there's a lot of work to be done. We haven't really tasked industry to put all their creative energy into this just yet. I think we need to press harder on that.

Q. Is there a role in AFGSC for attritable-type systems?

A. Absolutely. Our goal is to be the world's most feared and respected long-range force. Those kinds of capabilities can be added to our arsenal. Our ability to carry a lot, a long way, and reach out is one of the more important attributes in this next era of conflict.

With everything we're acquiring, we're looking for margin and affordability. The attributes we want are modern and mature technology; to own the technical baseline so that we can affordably and competitively modernize; [and] modular and open systems, so we can rapidly upgrade and update.

We've kept requirements very stable, and our intent is to get things on the ramp or in the silo on time and then run a modernization program. So if you continue down that path, you could do lots of things that I think are important.

<https://www.airforcemag.com/article/qa-right-sizing-bombers-and-people/>

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Real Clear Defense (Washington, D.C.)

In Defense of Deterrence

By Michael Rühle

April 30, 2020

Michael Rühle is Head, Hybrid Challenges and Energy Security, in NATO's Emerging Security Challenges Division.

The views expressed are the author's own.

Introduction: The Appeal of Deterrence

The concept of deterrence is congenial to Western democracies. As Lawrence Freedman put it, deterrence strategies "appeal to governments because they can be presented as being defensive but not weak, and firm but not reckless." [1] Deterrence implies that one can keep unwelcome developments at bay by remaining essentially passive: the mere show of force can substitute for military action. Military deterrence is essentially a status quo concept. It does not rule out political, social or economic change, nor does it rule out competition between states. However, it seeks to prevent an opponent from using force to achieve its antagonistic political aims, thus making major war less likely. To be sure, the concept has its share of logical inconsistencies and moral dilemmas. When effective, however, its gains far outweigh its costs.

An Anxious Re-Birth

As the international environment is characterized by increased competition, the concept of deterrence, after over two decades of having received scant attention in the West, has re-entered the strategic lexicon. However, this return of deterrence is burdened with a range of problems. On the nuclear level in particular, an international NGO-led effort seeks to de-legitimize the very concept that appears to have contributed to the "long peace" between the world's major powers. Arguing that nuclear deterrence is a myth, or that the system is too prone to failure, supporters of the Nuclear Ban Treaty and of nuclear disarmament in general fundamentally challenge the tenets of established nuclear governance. The Ban Treaty will not lead to nuclear disarmament, nor will it spell the end of nuclear deterrence. However, it will seriously complicate the deterrence policies of, and nuclear cooperation among, Western democracies. By contrast, authoritarian "managed democracies" (V. Putin) will not take it seriously as a policy to follow.

Other familiar criticisms of deterrence focus on the difficulty of proving the concept's effectiveness; the ethical and moral tension between the mere threat of military reprisals and their actual implementation; and the risk that it locks its protagonists into a permanent adversarial relationship. According to deterrence critics, by interpreting an adversary's policies and postures as a threat that requires a resolute response, both sides are condemned to think in "worst case" and

“action-reaction” categories, and thus remain unable or unwilling to explore pathways to overcome their hostility.

The end of the Cold War revealed the shaky intellectual foundations of such simplistic action-reaction models. The considerable military downsizing that followed the easing of East-West tensions brought home that once political relations change, so do force levels and postures. Many deterrence critics had misled themselves and others by their “negative militarism”, i.e. by their belief that in order to change political relationships one first had to change military strategies and force levels. The actual historical evidence suggests that significantly reducing force levels could only follow changed political relations.

Deterrence critics again confused cause and effect when they tried to give intellectual credibility to the goal of nuclear disarmament, such as President Obama’s “Prague agenda.” This agenda was bound to fail for numerous reasons, yet in their desire to make it work, many analysts-turned-advocates employed rather tortuous arguments. Some compared abolishing nuclear weapons to abolishing slavery or even to kicking the habit of smoking. Others tried to prove that nuclear deterrence was a myth, even though their arguments often defied common sense.[2] Still others admitted that achieving a nuclear-free world “would require a fundamental change in geopolitics,”[3] yet some tried to create the impression that restructuring international relations was just a matter of sufficient “political will.” Put simply, in the context of the Prague agenda, many deterrence researchers were willing to suspend serious research in favor of anti-nuclear activism. In the end, however, the familiar international system and related need for deterrence proved more durable than these critics advertised.

A New Wave of Deterrence Research

However, it is not only the critics of deterrence, but also some of its supporters, that are making it hard to give that concept its rightful, reasonable place. As the international environment is growing more complex, with an increasing number of actors using an ever-broader array of tools to compete, much attention is now being focused on how to apply deterrence to non-traditional, non-kinetic, or hybrid threats. Of course, there is no a priori reason why deterrence could not be applied to the non-military realm. After all, deterrence is a psychological concept that permeates all human activity, from education to criminal law. However, this emerging new research, which labels itself a new – fifth – “wave” in that field,[4] stretches that concept beyond recognition.

The new research acknowledges that deterring non-kinetic, non-existential and sometimes non-attributable actions is far more complex than deterring an adversary’s military action. Yet it argues that to deter an adversary from causing harm, the West does indeed have a considerable array of tools available: economic sanctions, freezing financial assets, cyber(counter)attacks, publicly naming and shaming the adversary for his malign actions, expelling diplomats, or closing legal gaps in order to deter illicit activities, to name but a few. These tools, if properly orchestrated, should provide Western nations with a rich menu of options for deterrence by punishment as well as by denial.[5] Others argue that in a world characterized by hybrid threats the punitive aspect of classical deterrence theory is becoming less relevant. Instead, much greater attention should be devoted to the study of incentives, i.e. how to encourage with incentives an adversary to do what one wants it to do.[6] In short, the “fifth wave” contends that the concept of deterrence can be adapted to reach far beyond existential military contingencies and military threats.

Analytical Confusion

The intellectual effort devoted to this new deterrence research is impressive. However, as with probably every “new” research field, it tends to overestimate its own relevance. For example, simply listing the actions that one might be able to apply to cope with a hybrid adversary does not

turn them into reality or even suggest if or when they could credibly contribute to deterrence: in non-existential contingencies, governments simply may not wish to make good on previously made deterrence threats, since this may be perceived as incurring other, and possibly much higher, political or economic costs. After all, unlike traditional military deterrence, where the adversaries' militaries stay away from each other, this new ("modern") deterrence, which is supposed to stretch across the cyber, economic and social domains, takes place in precisely those areas in which the adversaries are most closely entangled. Moreover, much of this research seems to proceed from the assumption that once an attacker is exposed, it will stop attacking. This is optimistic at best: exercises seem to reveal that most of the "softer" tools do not stop a determined aggressor. In short, the inherent assumption that a smaller, non-military challenge can somehow be deterred by an equally small non-military threat, as long as that threat is smartly "tailored," is likely to be proven wrong by the harsh reality of warfare in the grey zone.

And there is more. Among the most important findings of traditional deterrence research was that one had to look not only at the opponent's capabilities, but also at its interests, and that an opponent's actions could well be the (inadvertent) consequences of one's own. In other words, both sides interact on many levels. By contrast, the debate on deterring non-kinetic, hybrid threats thus far remains a one-way street: it postulates malign actors that seek to maximize harm on the West while minimizing cost to themselves. By acting in a grey zone that the West finds much harder to utilize for advancing its own strategic interests, and by using many tools that are off-limits to Western democracies, these adversaries appear even more ruthless and risk-prone than the opponents the West faced during the Cold War.

However, hyping non-existential threats while also hyping deterrence as an appropriate response dramatically drives up deterrence responsibilities and requirements. If deterrence is responsible for preventing every possible malign act an adversary might pursue, be it cutting undersea cables, orchestrating fake news campaigns, or hacking smartphones, deterrence strategies must be organized so as to prevent a nearly unending list of hostile behavior. If the deterrence challenge posed by adversaries is not just to the West's security, but in fact to the West's "way of life,"[7] then deterrence as a concept needs to be all-encompassing. Such an endless set of deterrence goals and threats, and such a perfectionist yardstick virtually ensure deterrence failure at some level. In a similar vein, if the West is seen as being in a permanent state of low-level, non-kinetic war with mischievous adversaries, seeking quid pro quos with these adversaries may appear both naïve and futile. Such a view would narrow Western policy options, as it implies a degree of inevitability of conflict that could discourage the search for political solutions. By contrast, traditional deterrence theory, which centers more narrowly on ruling out the use of military force, leaves room for political accommodation—as demonstrated to some extent by the ending of the Cold War.

Getting Back to Basics

The current state of affairs has one school of thought dismissing the value of deterrence, and another setting up unrealistically expansive expectations. These two extremes hinder rather than help efforts to devise plausible, credible deterrence strategies for an increasingly competitive international environment. However, the "deterrence extremists" are not likely to prevail. Three reasons stand out.

First, since any major debate about deterrence always reflects the prevailing general political mood, one can assume that much of the alarmism that marks the current discussion on deterring non-existential, hybrid threats will wane, just as the nuclear disarmament camp had its proverbial 15 minutes of fame during in the "yes-we-can" euphoria of President Obama's first tenure. Back then, some observers sensed a window of opportunity to change the global security discourse – an opportunity that made even some hard-boiled realists suddenly believe in the feasibility of nuclear

disarmament. However, the issue quickly disappeared from the headlines once its complexities became apparent, particularly including the harsh realities of Russian and Chinese behavior, and once other important challenges demanded the Administration's attention. Today's attempts to deter new, non-military threats proceed against the backdrop of a debate about the decline of an increasingly divided West. Much of this debate rests on the implicit assumption that the authoritarian, revisionist states are somehow "winning", and that the West needs to scramble in order to avoid defeat. Once the formidable challenges of deterring non-traditional attacks become clear, however, and once it also becomes clear that the West's opponents are not as "successful" as they currently seem, the nervousness of the current debate will subside. In short, the extremes in the deterrence debate are not likely to have enduring influence on Western policy.

Second, deterrence thinking is constantly evolving. Traditional deterrence theory, for example, has long left behind the overly optimistic expectations that characterized its earlier days, when some held the view that that a "balance of terror" would not only deter virtually every kind of conflict among great powers, but also provide ample compellence leverage. Today, it is widely accepted that deterrence – nuclear or conventional – is not a panacea, and that it only works under certain conditions. Among these are that the interests at stake are truly significant, that the opponent's goals, culture and perceptions are taken into account, and that one communicates with an adversary in order to signal clear "red lines" but also to provide possible "off-ramps" for de-escalation. There are indications that the "fifth wave" will undergo a similar evolution. For example, after having started with rather abstract deterrence concepts that were uncritically applied, this research is now getting more concrete. Terms like "hybrid actor" are being replaced with the names of the real countries or terrorist organizations that challenge the West. This allows for a move away from an indiscriminate all-hazards approach and towards a more realistic evaluation of how deterrence might (or might not) work in specific instances.

A third reason for optimism is the broader focus on resilience. While enhancing the resilience of, say, national cyber or energy networks should be seen as a kind of deterrence by denial, deterrence is not the key consideration in the resilience calculus. Rather, it proceeds from the assumption that attacks will happen and, consequently, the stricken company, nation, or alliance must be able to take the hit and bounce back. This does not diminish the value of exploring new ways of deterring such non-kinetic, non-military attacks, in particular those that threaten existential interests.[8] However, as deterrence research in these domains becomes more refined, the opportunities and limits of this concept will become more apparent, and resilience may well emerge as the more useful paradigm for coping with most non-military challenges. Rather than trying to stretch or re-define deterrence to make it more applicable to today's more complex lower-level threats, resilience contemplates the possibility of deterrence failure. This may strike some observers as fatalistic, yet it is the most plausible approach for prevailing in an emerging multi-player world.

Conclusion: Defending Deterrence

Defending deterrence against its most ardent critics is a never-ending story. Despite its common sense appeal and demonstrated great value, the concept – notably its nuclear dimension – contains too many risks and moral challenges to remain uncontested. However, pending a fundamental transformation of the global system, deterrence will remain a major factor in international politics. At the very least, it should serve as a "time-buying strategy" until such fundamental political changes occur. This requires supporters of mainstream deterrence to walk a fine line between defending the concept without trivializing its risks. When it comes to deterring non-military, non-kinetic, and non-existential threats, however, even greater care must be taken not to oversell the concept. Classic deterrence is implemented by governments. The idea that the private sector, financial institutions and other players can be integrated into a coherent, multidimensional deterrence concept against a host of non-military threats risks promising much more than can be

delivered. As paradoxical as it may seem, deterrence needs to be defended against not only its critics, but against its unrealistically demanding supporters.

Notes:

[1]. Lawrence Freedman, *The Limits of Deterrence*, in Becca Wasser et al. (eds.), *Comprehensive Deterrence Forum*, RAND (CF345), Santa Monica, 2018, p. 25, available at https://www.rand.org/content/dam/rand/pubs/conf_proceedings/CF300/CF345/RAND_CF345.pdf.

[2]. For a typical example of attacking strawman arguments on nuclear deterrence see Ward Wilson, *Five Myths About Nuclear Weapons* (Boston, New York: Houghton Mifflin Harcourt, 2013).

[3]. William J. Perry, James R. Schlesinger (eds.), *America's Strategic Posture: The Final Report of the Congressional Commission on the Strategic Posture of the United States* (Washington, D.C.: United States Institute of Peace Press 2009), p. xi, available at https://www.usip.org/sites/default/files/America's_Strategic_Posture_Auth_Ed.pdf.

[4]. The first three waves focused on strategic nuclear deterrence, the fourth wave examined how to deter terrorists, see Jeffrey W. Knopf, "The Fourth Wave in Deterrence Research," *Contemporary Security Policy*, Vol. 31, No.1 (April 2010), pp. 1–33, available at <https://www.tandfonline.com/doi/pdf/10.1080/13523261003640819?needAccess=true>.

[5]. Vytautas Keršanskas, *Deterrence: Proposing a more strategic approach to countering hybrid threats* (public version of the "Deterrence Playbook"), The European Centre of Excellence for Countering Hybrid Threats, Helsinki, March 2020, available at <https://www.hybridcoe.fi/wp-content/uploads/2020/03/Deterrence.pdf>.

[6]. Stephan De Spiegeleire, et al., *Reimagining Deterrence: Towards Strategic (Dis)Suasion Design*, The Hague Centre for Strategic Studies (HCSS), March 2020. See also Frans-Paul van der Putten, et al., *Deterrence as a security concept against non-traditional threats*, Netherlands Institute of International Relations (Clingendael), June 2015, available at https://www.clingendael.org/sites/default/files/pdfs/deterrence_as_a_security_concept_against_non_traditional_threats.pdf.

[7]. Elizabeth Braw, "We must learn what to do when the lights go out," *The Times*, 10 May 2019, available at <https://www.thetimes.co.uk/article/we-must-learn-what-to-do-if-the-lights-go-out-1cph6cqt>.

[8]. NATO Allies have declared that a cyber or hybrid attack can trigger Article 5 of the Washington Treaty. The 2018 US Nuclear Posture Review hints at the possibility of a nuclear response to a major non-kinetic attack.

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https://www.realcleardefense.com/articles/2020/04/30/in_defense_of_deterrence_115237.html

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US COUNTER-WMD

The Gazette (Colorado Springs, Colo.)

Colorado Springs Anti-missile Troops Increase Readiness amid Virus Threat

By Tom Roeder

April 24, 2020

In the past month, North Korea has tested missiles, Russia launched a rocket with an anti-satellite weapon and Iran rocketed a satellite in orbit.

Each test has been warily watched by troops in Colorado Springs to see if the launches aimed a warhead at North America. Their job: shoot down incoming enemy warheads.

The 100th Missile Defense Brigade has remained on the job through the pandemic, making sure America's rivals don't take advantage of the havoc caused by the coronavirus by launching a surprise attack.

"It goes from conversation to business real quickly," said Col. Chris Williams, the 100th's commander who has watched his crews jump into action when missiles fly overseas.

Keeping the 100th healthy and ready to respond has been Williams' biggest mission in recent weeks. The National Guard brigade has troops in Colorado, California and Alaska who control a fleet of 44 interceptor missiles.

Those interceptors, in silos at Fort Greely, Alaska, and Vandenberg Air Force Base, Calif., are designed to take out enemy warheads at the edge of space. Teaming with Air Force and Missile Defense Agency radars and airmen operating satellites that spot rocket launches, the 100th must act in seconds if an enemy attacks.

"They take it with utmost seriousness," Williams said.

Now, the 100th is taking health seriously, too. The crews are kept in isolation. They are allowed only to go to work and go home.

At Schriever Air Force Base, they use bleach to tackle the coronavirus threat before they sit down at launch consoles to handle missile threats.

"We have increased the frequency of sanitizing our work areas," Williams said.

The National Guard got the missile defense mission after the 9/11 attacks. In part, the Guard was given missile defense because of its traditional role in homeland defense. Giving the mission to the Guard also won congressional backing to pay for the missile defense system, which has cost an estimated \$41 billion.

Other National Guard units have cut training amid the virus, because training for war means bringing large numbers of troops together.

At the 100th, where most of the troops are in uniform full time instead of the one weekend a month most Guardsmen spend on duty, training has increased.

Because the missile defense troops work in small, focused crews, they don't need large field exercises. And Williams has worked to get more of his soldiers ready to fill in if his regular crew winds up quarantined for coronavirus.

"We are more ready now than we have been in the last 16 years," he said.

Williams doesn't take full credit for that readiness. Keeping his crews so isolated has meant that family members in the 100th have had to fill bigger roles.

"The jobs they do in my mind are just as important as the jobs our soldiers are doing," Williams said. "Somebody has to go to the grocery store and somebody has to get gasoline in the vehicles."

The brigade has steered clear of the virus threat. And they're aware that America's enemies are watching as the nation struggles with COVID-19.

Williams said if an enemy makes a rash decision and targets North America with a missile, they'll have to deal with his troops.

"We are trained, and we're ready. We are prepared."

Contact Tom Roeder: 636-0240

https://gazette.com/military/colorado-springs-anti-missile-troops-increase-readiness-amid-virus-threat/article_07d7553a-8633-11ea-9a70-7793d583b1ce.html

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US ARMS CONTROL

Radio Free Europe / Radio Liberty (Prague, Czech Republic)

U.S. Seeks to Extend Iran Arms Embargo, Setting Stage For Clash Over Nuclear Deal

By RFE/RL

April 29, 2020

Secretary of State Mike Pompeo says the United States will not allow Iran to buy or sell conventional arms after a UN embargo expires in October, in a move that could prompt Tehran to pull out the 2015 nuclear deal and a major nonproliferation treaty.

"We're not going to let that happen," Pompeo told reporters at a news briefing on April 29 when asked about the expiration of the arms embargo.

"We will work with the UN Security Council to extend that prohibition on those arms sales and then in the event we can't get anyone else to act, the United States is evaluating every possibility about how we might do that," he said.

The ban on selling conventional weapons to Iran ends on October 23 under UN Security Council Resolution 2231, which enshrined the 2015 nuclear deal between Tehran and world powers.

The United States withdrew from the nuclear accord, known as the Joint Comprehensive Plan of Action (JCPOA), in 2018 and reimposed sanctions on Iran, raising tensions across the Middle East and sending the Iranian economy into a tailspin.

China and Russia, both signatories to the nuclear deal believed to be eager to sell arms to Iran, are likely to exercise their veto at the Security Council to oppose extending the UN arms embargo.

To circumvent China and Russia's veto power, Pompeo said the United States was prepared to argue that it is still a participant in the nuclear accord because it was listed as one under the UN resolution.

That claim comes even as President Donald Trump clearly stated in May 2018 he was "terminating the United States' participation" in the JCPOA.

Parties to the nuclear deal can implement a so-called "snapback" mechanism to reimpose sanctions or extend the arms embargo by declaring Iran to be in violation.

"The UN Security Council Resolution 2231 is very clear: We don't have to declare ourselves a participant," Pompeo told reporters. "It's unambiguous and the rights that accrue to participants in the UN Security Council resolution are fully available to all those participants."

European diplomats have questioned whether Washington can trigger the sanctions snapback because it exited the deal.

Pompeo said that the United States was also urging action from Britain, France, and Germany, the so-called E3 who remain participants to the JCPOA and have tried to save it.

Europe, while sharing U.S. concerns over Iran's activities in the Middle East and its missile program, already has separate arms restrictions and believes the nuclear issue is more important.

'Maximum Pressure' Vs. 'Maximum Resistance'

There are also questions of whether the existing UN arms embargo is effective as Iran continues to supply regional allies and proxies.

Ali Vaez, the Iran Project director at the International Crisis Group, told RFE/RL that an extension was also unlikely to stop China or Russia from selling arms to Iran.

"The removal of the arms embargo is one of the few remaining benefits of the JCPOA for Iran. Depriving Tehran from having access to the arms market will compel Iran to double down on its support for proxies and its ballistic missiles program," he said.

In response to the United States' "maximum pressure" campaign, Iran has ratcheted up regional tensions and breached parts of the nuclear deal it says can be quickly reversed if the other parties comply with their obligations.

A so-called "strategic patience" doctrine designed to bide time in hopes Trump is a one-term president has shifted to one of "maximum resistance."

Having gained little economic benefit under the nuclear deal, Iranian officials have said they may completely withdraw from the JCPOA and international Non-Proliferation Treaty if the arms embargo is extended.

"This is not a bluff. It allows Tehran to gain immediate leverage and it creates an international nonproliferation crisis that could backfire on Trump during his re-election campaign" ahead of the November election, Vaez said.

<https://www.rferl.org/a/iran-pompeo-jcpoa-nuclear-arms-us-/30584029.html>

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Phys.org (Isle of Man)

Catching Nuclear Smugglers: Fast Algorithm Could Enable Cost-effective Detectors at Borders

By Kate McAlpine, University of Michigan

April 29, 2020

A new algorithm could enable faster, less expensive detection of weapons-grade nuclear materials at borders, quickly differentiating between benign and illicit radiation signatures in the same cargo.

The development is a collaboration among researchers at the University of Illinois at Urbana-Champaign, the University of Michigan, Los Alamos National Laboratory, Heriot-Watt University (Edinburgh, UK), and the University of Edinburgh.

"We hope that the findings will be helpful in reducing the false positive alarms at radiation portal monitors, even in scenarios with multiple sources present, and enable the use of cost-effective detectors, such as organic scintillators," said Angela DiFulvio, an assistant professor of nuclear, plasma and radiological engineering at the University of Illinois and corresponding author of the study recently published in Nature Scientific Reports.

DiFulvio is also a former postdoctoral researcher in the Detection for Nuclear Nonproliferation Group at U-M, led by Sara Pozzi, a professor of nuclear engineering and radiological science.

Nations need to protect their citizens from the threat of nuclear terrorism. Nuclear security deters and detects the smuggling of special nuclear materials—highly enriched uranium, weapons-grade plutonium, or materials that produce a lot of radiation—across national borders.

The researchers developed an algorithm capable of identifying weak radiation signals, such as might be seen from plutonium encased materials that absorb radiation. It works even in the presence of a high radiation background, including everyday sources such as cosmic rays from space and radon from the rock underfoot.

Based on their results, they believe the use of their algorithm could improve the ability of radiation portal monitors at national borders to tell the difference between potential smuggling activity and benign radiation sources. For instance, naturally occurring radioactive materials such as ceramics and fertilizers, or radionuclides in recently treated nuclear medicine patients, can set off "nuisance" alarms at radiation scanning facilities.

"There's also the concern that somebody might want to mask a radioactive source, or special nuclear material, by using naturally occurring radioactive materials such as granite or kitty litter," said Pozzi, who is also senior author on the paper.

"As vehicles or boxes are scanned, the data from the detector can be put through these algorithms that unmix the different sources. The algorithms can quickly identify whether special nuclear materials are present," she added.

Unmixing sources so that smuggling activity can't be hidden among benign radiation sources is hard to do quickly. For that, the team turned to specialists in machine learning, who could use data collected by Pozzi's group to "train" algorithms to look for the signatures of materials that could be used to make a nuclear bomb.

"We crafted an unmixing model that both reflects the basic physics of the problem and was also amenable to fast computation," said co-author Alfred Hero, the John H. Holland Distinguished University Professor of Electrical Engineering and Computer Science and R. Jamison and Betty Williams Professor of Engineering U-M.

This research began at U-M as part of the Consortium for Verification Technology, a 5-year \$25 million nuclear nonproliferation research program funded by the U.S. Nuclear National Security Administration, led by Pozzi. DiFulvio continued the work when she moved to UIUC in 2018.

"This work is a powerful example of the benefit of close and sustained collaboration between computational data scientists and nuclear engineers, resulting in major improvement of nuclear radiation detection and identification," Hero said.

The paper is titled, "Expectation-propagation for weak radionuclide identification at radiation portal monitors," and is published in the journal Scientific Reports.

<https://phys.org/news/2020-04-nuclear-smugglers-fast-algorithm-enable.html>

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MIT News (Cambridge, Mass.)

3 Questions: Areg Danagoulian on a New Arms Control Tool and the Future of Nuclear Security

By Leda Zimmerman

April 23, 2020

Areg Danagoulian, associate professor in the MIT Department of Nuclear Science and Engineering, has built a career around nuclear detection technology. His work has focused, among other things, on a system that could greatly improve the current process for verifying compliance of nuclear warheads.

Earlier this year, he published new work on physical cryptographic nuclear warhead verification and on active detection of shielded nuclear materials in journals including Nature Communications and the Proceedings of the National Academy of Science. He has also received a pair of prestigious accolades: a radiation science and technology award from the American Nuclear Society and the honor of being named, along with his team, as the 2019 Arms Control Association (ACA) Arms Control Persons of the Year. "This innovation paves the way for more effective arms control agreements, inspections, and enforcement," said Daryl Kimball, executive director of the ACA. "Professor Danagoulian's MIT team has brought the best science to arms control and provided a creative solution that can reduce nuclear threats and enhance security."

In a recent conversation, Danagoulian spoke about his work and its impact on the future of international security.

Q: What is the new approach to nuclear warhead verification you and your team have developed?

A: Up to now there have been no ways to verify warheads, or to verify dismantlement of warheads. For security reasons, nuclear powers don't let inspectors get close to their warheads, and the conventional method for offering proof of dismantlement relies on destroying weapons delivery systems — cutting wings off B-52 bombers, for example. Our approach uses neutron resonance transmission spectroscopy to capture a unique fingerprint of the relevant isotopes in a nuclear weapon as well as its geometry. This method involves bombarding a warhead with a neutron beam, which is modulated by the warhead's isotopic and geometric makeup. After exiting the warhead, the beam is scrambled by an encrypting filter and is then captured by a neutron detector. Each warhead has a specific profile, so arms inspectors can use information from our detector to verify that fissile material from a dismantled weapon truly matches a previously authenticated, "golden copy" object. The physical encryption means verification can be accomplished without revealing the

engineering particulars of a warhead component, and in a manner that prevents computer hacking or other kinds of manipulation.

Q: What sets this method of verification apart from other approaches?

A: We came up with something that is very hard to cheat, which is the Holy Grail for people pursuing authentication. Even where there are disarmament treaties, there is an incentive to cheat and maintain an advantage. Without the capacity to determine whether the other side's warhead is real, or if its warhead has actually been dismantled, a nation might well view a current or future treaty as toothless.

Efforts in the area of authentication go back a number of decades. Early work involved collaboration on technology between national labs here and the Russians, in the days when they were happy to work and socialize together. Their methods relied on computers to protect sensitive information, which meant the whole verification process was vulnerable to hacking. In the past decade or so, there have been efforts to make this digital information more secure, so that a host country could not, for instance, sneak in some information that looked like a weapon for the inspectors to count.

But we wanted to think of a different and better approach. And not just us: Teams in academia and national labs too have been working on concepts of physical cryptography. Groups at Princeton, Los Alamos, Sandia, Oak Ridge, and elsewhere have made significant advances. After much iteration on our idea, including extensive computer simulations and experimental testing, we've shown that our techniques are both very hoax proof and very secure. And what we've been developing is quite a bit more practical than the systems proposed by other groups. Our technology is simpler, and doesn't require millions of dollars in equipment. In fact, we're trying to build an effective experimental apparatus that can fit in a small laboratory and will cost around \$100,000. It won't be easy, but we are working on feasibility studies now with colleagues at Princeton University.

Q: By lowering technological barriers for verification, might your research help strengthen current nuclear treaties, or even spark new treaties?

A: We have to approach this with humility. I tell everyone that we can produce the best technology out there but without the political will, it won't go anywhere. I don't think that just by providing them with the technical means we will be able to force or convince politicians to surrender their reservations. This is the barrier to overcome.

Take the Comprehensive Test Ban Treaty, which the U.S. signed but never ratified. One of the excuses for not ratifying was that Russians could cheat the verification system. In the early 90s, the Russians really had little interest in building up their arms program; they were preoccupied about putting bread on the table. But even though cheating the verification protocols was very unlikely, it was technically possible. Opponents of the treaty exploited that fact, among others, to derail ratification.

For the future, we have to put in place solutions that are both political and technological, and make it harder for opponents to amass talking points against new treaties. In the meantime, my team continues to work on ways to make our authentication system even better and more practical. We are exploring a new type of physical cryptography using electricity that will render it truly resistant to information leaks. This is a tangible step in advancing technology that could make possible more ambitious and far-reaching arms control treaties down the road. My hope is modest: to put the seeds of thoughts of what is possible into the heads of policy experts and policymakers so when there is a thaw in relations, a new spring, the seeds will germinate and we will have real results.

<http://news.mit.edu/2020/3q-areg-danagoulian-new-arms-control-tool-future-nuclear-security-0423>

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COMMENTARY

The Hill (Washington, D.C.)

How to Lose a War without Firing a Shot? Ignore our Enemies' Arms-control Violations

By Peter Pry

April 27, 2020

The State Department has released the unclassified executive summary of its new report — Adherence to and Compliance with Arms Control, Nonproliferation, and Disarmament Agreements and Commitments — an annual report focused on arms control violations and noncompliance by Russia, China, North Korea, Iran and others.

The State Department finds Russia, China, North Korea, Iran, Syria, Azerbaijan, Armenia and Burma in violation or noncompliance with various arms control commitments, including the nuclear Threshold Test Ban Treaty (TTBT), unratified Comprehensive Test Ban Treaty (CTBT), Intermediate-Range Nuclear Forces Treaty (INF), Presidential Nuclear Initiative (PNI), Nuclear Non-Proliferation Treaty (NPT), Chemical Weapons Convention (CWC), Biological Weapons Convention (CWC), Conventional Armed Forces in Europe Treaty (CFE), and the Open Skies Treaty (OST).

Every year for decades, the State Department has reported significant arms control violations and noncompliance by Russia and other potential adversaries of the United States.

Dangerously — with rare exceptions — the White House, Congress and Washington foreign policy and defense establishments regard U.S. unilateral compliance with arms control agreements, while Russia and others routinely violate agreements, with complacency. It's "business as usual."

The State Department's Compliance Reports, so-called in shorthand, do not assess the threat to the United States from unilateral U.S. compliance with all arms control agreements while Russia, China and others are cheating.

Perhaps the Department of Defense (DOD) Office of Net Assessment should begin supplementing State's reports with a National Security Impact Report for U.S. unilateral compliance while our adversaries cheat on arms control.

Some examples:

Russia's violation of the INF Treaty, by deploying new-generation nuclear missiles threatening Europe, undermines security of NATO and credibility of U.S. extended nuclear deterrence. Fortunately, President Trump and his administration understand this, which is why they withdrew the U.S. from the treaty.

Russia's violation of the PNI to dismantle tactical nuclear weapons, while the U.S. proceeded to deeply cut such weapons, has resulted in giving Moscow at least a 10-to-1 advantage in tactical nuclear weapons, and superiority in the overall nuclear balance.

Violations of the NPT increase the nuclear threat to the United States from fanatical and unpredictable actors such as Iran and North Korea.

Russia, China, North Korea, Iran and others violating the BWC and CWC potentially risks exposing U.S. troops and the American people to “bugs and gas,” against which we have no defenses. We could lose a war.

Russian violation of the CFE, which Moscow has openly abrogated, could enable Russian tanks, mobilized under the guise of a big exercise, to overrun NATO front-line states in 72 hours. DOD and RAND Corporation have warned about this.

Russian violation of OST further diminishes the United States’s already grossly inadequate capabilities to verify compliance with arms control agreements.

The big news in the 2020 Compliance Report is that Russia and China have been violating the TTBT and CTBT by conducting nuclear tests, while the U.S. has complied with the agreements and conducted no tests since 1992. “Russia has conducted nuclear weapons experiments that have created nuclear yield and are not consistent with the U.S. ‘zero yield’ standard,” the report cautions.

The report further states that China’s “possible preparation to operate its Lop Nur test site year-round, its use of explosive containment chambers, extensive excavation activities at Lop Nur, and lack of transparency on its nuclear testing activities — which has included frequently blocking the flow of data from its international monitoring system (IMS) to the international data center operated by the Preparatory Commission for the Comprehensive Nuclear Test-Ban Treaty Organization — raise concerns regarding China’s adherence to the ‘zero yield’ standard.”

Thus, the U.S. is probably 28 years behind Russia and China in developing advanced nuclear weapons based on new designs and technology.

Russia openly writes about having new-generation nuclear weapons based on “new physical principles” such as Super-EMP, neutron and X-ray warheads; “clean” warheads that produce no radioactive fallout; “dirty” super-high-yield (100 megatons) doomsday warheads; and ultra-low-yield warheads “useable” by land, air and naval forces.

What all this means is that the U.S. could lose a nuclear war.

Knowing this, would the U.S. dare risk war with Russia or China? Will U.S. allies trust our security guarantees and continue to be allies? Is the U.S. already losing the “new cold war” because of arms control? Worse, the violations of arms control agreements by Russia, China and others almost certainly are far worse than the Compliance Reports acknowledge.

The State Department’s bread and butter is arms control. Historically, State has been reluctant to acknowledge violations of arms control agreements; the department and the intelligence community covered up Russia’s violations of the INF Treaty for years during the Obama administration.

Both the State Department and the intelligence community are unreformed from the Obama years, still preferring to “see no evil” when it comes to violations of arms control sacred cows. They still have not declassified President Reagan’s General Advisory Committee report, “A Quarter-Century of Soviet Compliance Practices Under Arms Control Commitments, 1958-1983” that exposed the long history of failed arms control.

Predictably, many left-leaning organizations — such as the Arms Control Association, the Federation of American Scientists, Union of Concerned Scientists, and former Obama administration officials — will defend Russia and China, claiming that they are not really cheating.

It seems we still have not learned the Latin adage, “Si vis pacem, para bellum” — If you want peace, prepare for war.

Dr. Peter Vincent Pry was chief of staff of the Congressional EMP Commission and served on the staff of the House Armed Services Committee and at the CIA. He is the author of several books, including “The Power And The Light: The Congressional EMP Commission’s War To Save America 2001-2020” (2020).

<https://thehill.com/opinion/national-security/493998-how-to-lose-a-war-without-firing-a-shot-ignore-our-enemies-arms-control-violations>

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European Leadership Network (London, U.K.)

COVID-19 Shows That the Biological Weapons Convention Must Be Strengthened

By Carlo Trezza

April 27, 2020

The US Joint Chiefs of Staff Committee Chairman Mark Milley recently declared that US intelligence is taking a “hard look” at whether the coronavirus originated in a Wuhan research lab rather than in an open-air market. Meanwhile, US Republican Senator Tom Cotton has hinted that the outbreak might have come from a weapons programme. Such allegations, which have been floated since the early days of the pandemic, have been vigorously denied by the Chinese authorities and have not been scientifically substantiated. But uncertainties surrounding the origins of the pandemic remind us of the dual nature, civilian and military, of biological sciences and their inherent weapons potential. History Since antiquity, biological agents and toxins have been considered as possible instruments of war. They could still be part of the military arsenals of some countries. Together with nuclear and chemical weapons, they are weapons of mass destruction – weapons that can cause catastrophic effects worldwide. In 1925, in the aftermath of the First World War, during which chemical weapons were widely used, a Protocol was negotiated in Geneva banning the use of such weapons. Biological weapons were also included, probably due to the appalling “Spanish” flu pandemic which caused millions of deaths between 1918 and 1920. Mainly motivated by humanitarian considerations, the ban only prohibited the use of chemical and biological weapons in war, not their possession nor their production. The international community had to wait until 1972 for the achievement of a total biological weapons ban through the Biological Weapons Convention (BWC) and until 1993 for a chemical weapons ban through the Chemical Weapons Convention (CWC). Under the Biological Weapons Convention states undertook “never in any circumstances to develop, produce, stockpile or otherwise acquire or retain” biological weapons or their means of delivery. They also undertook to destroy all the weapons in their possession. To support the implementation of the BWC, in 1990 the Australia Group (a multilateral regime to prevent the proliferation and export of chemical weapons) extended its provisions to include biological weapons. And in 2004 a binding resolution of the UN Security Council (UNSCR 1540) became a key tool in preventing weapons of mass destruction (including biological ones) from falling into the hands of terrorist groups. Shortcomings To this day, the BWC remains the pillar of international biological arms control. It has undoubtedly contributed to international peace and security. But the Convention is unable to verify and deal with violations. And it has other shortcomings:

In response to a perceived violation, states under the BWC only have the choice of consulting with one another or of lodging a complaint with the United Nations Security Council (UNSC) in the hope of securing an enforceable UNSC Resolution with the consensus of all five permanent members of the Council (P5). A state can also appeal to the International Court of Justice but not all states are legally bound by the BWC nor have they necessarily all accepted the compulsory jurisdiction of the ICJ in all legal disputes.

There is no standing body to ensure the implementation of the BWC. At present, this function is performed by a Review Conference, which only takes place once every five years, and through periodic meetings of member states and of experts. Since 2007, a small Implementation Support Unit (ISU) has been put in place. It has performed efficiently but its mandate and staffing (mostly financed by the European Union) are too limited.

The Convention lacks verification and inspection capabilities. After lengthy negotiations, an initiative to equip the BWC with a verification protocol was in the end wrecked by the United States at the 2002 BWC Review Conference.

14 countries have still not ratified the BWC, including states in regions of major tension.

In short, the present international regime is inadequate for handling a biological weapons crisis and addressing its humanitarian and legal consequences. RecommendationsThe following measures to strengthen the regime should be considered:

In the absence of a standing international body to oversee implementation of the BWC, the option of placing biological weapons under the jurisdiction of the existing Hague-based Organisation for the Prohibition of Chemical Weapons (OPCW) should be explored. There are already instances, such as the 1925 Protocol, the Australia Group, the UNSCOM and UNMOVIC Commissions dealing with weapons of mass destruction in Iraq, and UNSC Resolution 1540, in which biological and chemical weapons are or have been dealt with jointly. The 2016 BWC Review Conference noted “the increasing convergence of biology and chemistry and its possible challenges and opportunities for the implementation of the Conventions”.

More generally, despite the failure in 2002, the idea of equipping the BWC with a verification or investigation mechanism should be revisited. Even if, as some believe, verification cannot fully ensure the implementation of the BWC, that must not become a pretext for doing nothing. The precedents of UNSCOM and UNMOVIC in Iraq show that bio-verification is at least feasible. By defeating the verification initiative in 2002, the United States deprived itself and the rest of the international community of a tool that would have been useful today for investigating the origins of the coronavirus outbreak. Relying purely on US national intelligence is not credible internationally.

A concerted effort must be made to encourage strategically significant countries such as Egypt, Israel, and Syria to join the rest of the world in renouncing these hideous weapons, which are capable of indiscriminately killing thousands upon thousands of civilians. They are weapons of terror with no strategic value.

The next Biological Weapons Convention Review Conference will meet in 2021. The present pandemic must be the catalyst for strengthening the Biological Weapons Convention.

The opinions articulated above represent the views of the author(s) and do not necessarily reflect the position of the European Leadership Network or any of its members. The ELN's aim is to encourage debates that will help develop Europe's capacity to address the pressing foreign, defence, and security policy challenges of our time.

<https://www.europeanleadershipnetwork.org/commentary/covid-19-shows-that-the-biological-weapons-convention-must-be-strengthened/>

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

COVID-19 and British Nuclear Deterrence

By David Arceneaux

April 24, 2020

In early April, British Prime Minister Boris Johnson nearly died. Suffering from COVID-19, Johnson spent three nights in the intensive care unit before eventually recovering and being discharged. Without the expert and round-the-clock attention of his medical team, the prime minister later admitted, he may not have survived.

Johnson's stint in an intensive care unit raised a sensitive question related to British national security — with the prime minister incapacitated, who was authorized, if required, to launch the country's nuclear weapons?

For fifty years, Britain has conducted continuous at sea deterrent patrols. Through these patrols — entitled Operation Relentless — the Royal Navy has persistently maintained at least one of its four ballistic missile submarines in the world's oceans to guarantee that its nuclear arsenal is prepared for use at any time. The uninterrupted deployment of ballistic missile submarines is a central pillar of Britain's nuclear planning and currently serves as the backbone of the United Kingdom's strategic nuclear deterrent.

Even if only temporarily, the prime minister's recent health crisis produced ambiguities in the nuclear chain of command and could have rendered Britain's nuclear forces inert. Conservative member of parliament and Chair of the House of Commons Defence Select Committee Tobias Ellwood voiced this concern, observing that "it is important to have 100 percent clarity as to where responsibility for U.K. national security decisions now lies."

Statements by political leaders, however, offered little guidance on how the United Kingdom adjusted its nuclear chain of command, if at all. Foreign Secretary and First Secretary of State Dominic Raab agreed to deputize "where necessary" while the prime minister recovered, but it remains unclear whether he possessed the power to order nuclear use. When asked by the BBC whether Raab had inherited the authority to use nuclear weapons, Cabinet Office minister Michael Gove demurred, simply replying that he "cannot talk about national security issues."

COVID-19 has certainly disrupted and raised questions about Britain's routine nuclear command and control procedures. However, it's unlikely that the pandemic could lead to crippling command failures, such as precluding political leaders from transmitting nuclear use orders to military operators or preventing military forces from receiving and conducting an authorized nuclear attack. British nuclear command and control systems are designed to function even if all political leaders with formal nuclear launch authority are incapacitated. The ability to conduct nuclear operations under such circumstances reflects the United Kingdom's emphasis on robust command and control systems that originated during the Cold War and have persisted to contemporary nuclear planning.

Instead, the primary threat that COVID-19 poses to British arsenal readiness is its potential to directly impact military operators. Whereas the upper levels of the nuclear chain of command are robust and reliable, Britain's exclusive reliance on a single, at sea ballistic missile submarine to maintain strategic deterrence makes the United Kingdom's nuclear arsenal vulnerable to disruptions if COVID-19 directly impacts crewmembers of Britain's ballistic missile submarines or the personnel responsible for repairs and maintenance of those submarines. COVID-19 therefore poses challenges to British policymakers as they seek to maintain continuous at sea deterrent patrols and rotate crews and vessels on schedule. If COVID-19 cripples the nuclear ranks of the

Royal Navy, policymakers may face a world in which the United Kingdom has no operationally deployed nuclear weapons available to maintain its strategic nuclear deterrent.

Nuclear Decapitation by COVID-19?

Nuclear weapons serve several purposes for British foreign policy, including the promotion of greater national independence — both from its adversaries and its allies — and robust deterrence against nuclear aggression. Britain's strategic nuclear doctrine views nuclear weapons as a "deterrent of last resort" and asserts that nuclear weapons "would only be used in extreme circumstances of self-defense." The British nuclear deterrent therefore hinges upon the credibility of its threat to respond to aggression with nuclear weapons under any circumstances.

Public concerns regarding the impact of COVID-19 on Britain's nuclear command and control systems — referring to the operational means by which a state conducts the management, deployment, and potential release of nuclear weapons — capture a fundamental challenge of nuclear deterrence. In order to credibly deter an adversary, decision-makers must be able to authorize and communicate orders to use nuclear weapons under any circumstances. If COVID-19 renders political leaders unable to authorize nuclear use because these individuals are incapacitated or the procedures for devolution of nuclear launch authority become unclear, the United Kingdom's ability to use nuclear weapons might falter. Such a disconnect between political leaders with the authority to order nuclear use and military operators in possession of nuclear assets would fundamentally undermine deterrence and create a window of vulnerability that adversaries — especially Russia — could exploit. COVID-19 therefore threatens to create a gap in the United Kingdom's strategic nuclear deterrent for the first time in the era of continuous at sea deterrent patrols. Domestically, the costs of maintaining continuous at sea deterrent patrols has also renewed longstanding debates in Britain about the utility of nuclear weapons, as critics suggest that investments in nuclear weapons should instead be redirected to support public health programs and offset the economic costs of COVID-19.

Since 1969, ballistic missile submarines have constituted the United Kingdom's primary strategic nuclear delivery platform. The Royal Navy presently operates four Vanguard-class submarines carrying Trident II D5 ballistic missiles. Under normal circumstances, one submarine is deployed at sea and conducting a deterrent patrol, two submarines remain in port and prepared to deploy in the event of a crisis, and the fourth submarine is undergoing extensive maintenance that precludes deployment. Given that ballistic missile submarines are difficult to track and target, British policymakers rely on this delivery platform to serve as a reliable cornerstone of the United Kingdom's nuclear deterrent.

Mobility and concealment make ballistic missile submarines highly survivable, but the prospect of nuclear decapitation — an attack that disrupts the target's command and control systems and makes it impossible to coordinate retaliatory strikes — could potentially undermine Britain's nuclear deterrent. To guarantee that nuclear weapons are always prepared for use, the United Kingdom has adopted "delegative" command and control systems that provide peripheral military commanders with the ability to use nuclear weapons at all times. These delegative control systems provide Britain's military operators with physical control of nuclear warheads and delivery systems, forego technical barriers to nuclear use, and enable the military to use nuclear weapons without necessarily requiring political authorization. By delegating the ability to use nuclear weapons to military commanders during peacetime, Britain significantly reduces the likelihood of an adversary conducting a successful nuclear decapitation strike. This posture allows command and control systems to "fail deadly," meaning that if communications between political leaders and military operators are severed, the military still has the ability to use nuclear weapons unilaterally. These command and control arrangements protect against decapitation but, by providing military

operators with the physical, technical, and administrative means for nuclear use, also increase the likelihood of unauthorized use. Nevertheless, British policymakers accept this risk and continue to rely on military professionalism as the primary safeguard against unauthorized use.

The specific arrangements of British nuclear command and control demonstrate the resilience of these systems to nuclear decapitation. Physically, the Royal Navy possesses all necessary components to launch nuclear weapons on board its ballistic missile submarines when conducting deterrent patrols. Technically, the United Kingdom has purposefully avoided implementing nuclear-use controls that would impede the ability of the military to use nuclear weapons in a crisis setting when communications between political leadership and ballistic missile submarines might be severed. Administratively, although the United Kingdom's 2015 National Security Strategy and Strategic Defence and Security Review states that "only the Prime Minister can authorize the use of nuclear weapons," the Royal Navy's ballistic missile submarine crews always have the ability to use nuclear weapons, even if not the authority.

Two administrative controls protect British nuclear command and control systems from decapitation. First, since 2001 the United Kingdom has reinstated a Cold War policy that allows the prime minister to appoint up to three deputies who have the authority to commit nuclear forces in the event of the prime minister's death or incapacitation. Second, upon assuming office each prime minister writes a "letter of last resort" that remains in a safe aboard Britain's ballistic missile submarines. This letter provides instructions to the submarine's commander on how to proceed in the event that the submarine cannot communicate with political leadership during a crisis and guarantees that all ballistic missile submarines sail "with all the information onboard necessary to conduct a strategic missile launch." If a submarine loses communications with British policymakers, the crew attempts to listen to the BBC Radio 4 Today show. If the show cannot be heard, the submarine crew is to assume that the United Kingdom has been attacked and should then access the letter of last resort to perform a politically designed task, such as placing the submarine under U.S. command, sailing to Australia, targeting the state responsible for attacking the United Kingdom, or deferring to the judgment of the submarine's commander.

These measures suggest that COVID-19 is very unlikely to undermine Britain's nuclear deterrent by disrupting political control over nuclear use authority. During the Cold War, British policymakers developed the country's nuclear command and control systems to function in the aftermath of a nuclear attack on Britain's political leadership. The same emphasis on maintaining operational viability remains prominent in post-Cold War British nuclear thinking.

If anything, the United Kingdom's nuclear command and control systems are overprepared for any threat of nuclear decapitation posed by COVID-19. British command and control systems are designed to withstand attacks that happen quickly and on a massive scale. For example, by the early 1960s analysts estimated that the warning time for a Soviet missile attack on the United Kingdom was approximately four minutes. Such an attack could eliminate all senior political figures and would likely destroy the necessary infrastructure for any surviving decision-makers to communicate with a deployed ballistic missile submarine.

In comparison to a massive nuclear attack on Britain's command and control systems, COVID-19 is vastly less threatening to the operational readiness of the British nuclear arsenal. Whereas a nuclear attack on Britain's political leadership and command and control infrastructure could almost instantly incapacitate the entire political chain of command, COVID-19 would apply pressure to political leaders over a period of days or weeks. Indeed, the orderly transfer of governing authority from Johnson to Raab was made possible by a generous timeframe. Although British officials have historically declined to specify which individuals serve as deputies with nuclear launch authorization on grounds of national security, these procedures seemingly support the

devolution process identified by Jeffrey Lewis and Bruno Tertrais, in which the prime minister can appoint deputies to manage nuclear decisions in case the prime minister is incapacitated at some point in the future. Furthermore, even if COVID-19 incapacitates all political leaders in the nuclear chain of command at once, the persistent delegation of nuclear use capability to the Royal Navy's ballistic missile submarines guarantees that nuclear weapons can be used in the event of a crisis without requiring political authorization. Combined, these measures suggest that the United Kingdom's nuclear deterrent remains credible and resilient to the pressures that COVID-19 places on the nuclear chain of command.

COVID-19 and the Threat to Operational Nuclear Readiness

The primary danger that COVID-19 poses to the United Kingdom's strategic nuclear deterrent is its potential effects on military operators in the Royal Navy's nuclear-armed submarines. An outbreak of COVID-19 on Britain's ballistic missile submarines could ultimately force policymakers to choose between maintaining continuous at sea deterrent patrols to preserve credible deterrence or accepting a temporary stoppage of deterrent patrols to protect servicemembers.

COVID-19 is already affecting military readiness in multiple countries as leaders restrict movements and reduce military exercises. To date, the U.S. Navy alone has identified COVID-19 cases on four of its aircraft carriers. The outbreak of COVID-19 on the USS Theodore Roosevelt — with over 700 positive cases as of April 21 — provides a vivid example of the challenges facing military commanders as the pandemic continues to spread, with Capt. Brett Crozier writing a letter that outlined his concerns about the dangers of a COVID-19 outbreak on the ship before being fired by then-Acting Secretary of the Navy Thomas Modly. Elsewhere, Russia placed the entire crew of its K-266 Orel submarine under quarantine after identifying a positive case of coronavirus onboard the vessel. The Netherlands also terminated an ongoing exercise after the HNLMS Dolfijn identified eight positive cases of COVID-19. France has confirmed COVID-19 in nearly 60 percent of sailors on its flagship aircraft carrier, the Charles de Gaulle. In each of these cases, COVID-19 has significantly impacted the warfighting readiness of military forces.

The United Kingdom's reliance on ballistic missile submarines as the only operational leg of its nuclear arsenal makes its nuclear deterrent particularly vulnerable to disruptions by COVID-19. With approximately 130 servicemembers confined in extremely close quarters, the United Kingdom's Vanguard-class submarines provide extremely favorable conditions for the virus to spread. The lack of an air- or land-based nuclear delivery platform, however, means that ballistic missile submarines must remain in service to prevent a gap in the operational readiness of Britain's nuclear forces. If the military personnel of the ballistic missile submarine fleet are unable to conduct continuous at sea deterrent patrols, Britain's nuclear arsenal will lack the operational capability to deter potential adversaries.

That the Royal Navy only operates four Vanguard-class submarines further exacerbates the challenges posed by COVID-19 for maintaining continuous at sea deterrent patrols. Three specific challenges arise. First, with only one deployed submarine conducting deterrent patrols, COVID-19 can have a direct and immediate impact on the readiness of Britain's nuclear forces. If the deployed submarine experiences an outbreak of COVID-19 cases, it will be difficult to contain the spread of the virus onboard the submarine. The spread of COVID-19 would likely affect a large portion of crewmembers, including key individuals involved in the nuclear launch process.

Second, if a severe spread of COVID-19 forces a deployed ballistic missile submarine to return early from its deterrent patrol, the submarine designated to replace the returning vessel could face similar problems. If the crewmembers of the second ballistic missile submarine are not isolated and

quarantined in advance of their patrol to confirm that they are completely free of COVID-19, the second submarine could deploy with individuals carrying COVID-19 and experience another outbreak within the fleet of ballistic missile submarines. In this scenario, the United Kingdom nuclear arsenal would be reduced to one remaining ballistic missile submarine prepared for deployment and two ballistic missile submarines with widespread cases of COVID-19 that might preclude their deployment. Such a beleaguered nuclear force would have questionable reliability and would possess no viable alternatives for independently generating nuclear deterrence.

Third, COVID-19 threatens to interfere with the routine maintenance procedures that allow the Royal Navy to rotate ballistic missile submarines on schedule. If COVID-19 reaches the crewmembers responsible for the storage, processing, and maintenance of nuclear-armed submarines at HM Naval Base Clyde in Scotland — commonly referred to as Faslane — the Royal Navy will face further pressures on key personnel responsible for ensuring military readiness. These crews are already facing greater demand for their services than usual, as recent reports revealed that two of Britain's four Vanguard-class submarines have been under repair for the past year, rather than the typical rotation of one submarine under maintenance at a time. With only two ballistic missile submarines currently capable of operational deployment, the United Kingdom's nuclear deterrent has very little remaining room for error.

While the Royal Navy confronts reduced availability of operationally viable ballistic missile submarines and threat of COVID-19 to its operators and crewmembers, the Russian Navy has conducted "unusually high" levels of activity in the North Sea and the English Channel. British policymakers expressed concern that Russia conducted these operations to test the United Kingdom's defenses during the pandemic. With more than 10,000 members of Britain's armed forces serving in support of domestic efforts to provide logistical support and supplies to the National Health Service, the United Kingdom's conventional forces are also spread thin. Although the Royal Navy was able to effectively mobilize and respond by deploying nine ships to shadow seven Russian vessels during this episode, Russia's naval activities demonstrate how any increase in external pressure on the United Kingdom's security can place additional strain on British military forces that are already facing strains imposed by COVID-19.

Conclusion

COVID-19 will not undermine British nuclear deterrence by incapacitating the prime minister or his deputies. Long-standing and institutionalized procedures allow for the devolution of nuclear command authority to other political leaders, and the military custodians of nuclear assets retain the ability to launch nuclear weapons at all times.

Instead, the greater threat to Britain's nuclear deterrent is the potential for COVID-19 to directly affect crewmembers onboard nuclear-armed ballistic missile submarines and the personnel responsible for the maintenance and repair of these vessels. If the crews for either the patrolling or reserve vessels experience an outbreak of COVID-19, Britain may not be able to maintain continuous at sea deterrent patrols for the first time in over fifty years. This could tempt Russia to take advantage of a temporary moment of weakness, undermine the credibility and sustainability of Britain's nuclear posture, and damage the country's reputation as a leading military power.

The most important measures for sustaining Britain's nuclear deterrent will emphasize the health of the Royal Navy's ballistic missile submarine crewmembers. The Ministry of Defence's decision to quarantine crewmembers for two weeks before deployment represents a critical, proactive step toward ensuring that the rotation of ballistic missile submarines will operate on schedule. Each Vanguard-class submarine has two captains and two crews — known as "Port" and "Starboard" — that allow one crew to patrol aboard the submarine while the other crew trains and takes leave. By

canceling the rest and recuperation period for all personnel associated with forthcoming deployments, British leaders have developed necessary contingency plans to provide redundancy.

Although Johnson's recent health crisis and the potential effects it had on the United Kingdom's nuclear deterrent have received greater attention in the public sphere, the country's nuclear command and control systems are capable of handling those disruptions. The challenge of guaranteeing that COVID-19 does not affect the military personnel that conduct continuous at sea deterrent patrols represents the more important task for maintaining British nuclear deterrence. If COVID-19 reaches the submarine crewmembers conducting deterrent patrols or the personnel that keep continuous at sea deterrent patrols on schedule, this is the most likely pathway through which the United Kingdom experiences a gap in its strategic nuclear deterrent.

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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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