HOOVER HISTORY LAB
Policy Brief

Arms Uncontrolled

China's Strategic Nuclear Weapons Expansion and Its Implications for the United States

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INTRODUCTION

China is building out its nuclear weapons force, at scale and at pace. In a short period of time, China could develop a strategic arsenal equal to those possessed by Russia and the United States. More alarmingly, the combined total forces of Beijing and Moscow could easily outnumber those of the United States and its Western allies. Worse still, China's rise as a third great nuclear power also presents a fundamental challenge to parity-based US strategic doctrines that evolved during the bipolar Cold War confrontation with the Union of Soviet Socialist Republics (USSR). So, given the grave danger, how should the United States respond at this time? Indeed, what can Washington truly do about this perilous situation, which continues to evolve as the United States and Russia maintain the terms of their 2021 five-year extension of the New START treaty while an unconstrained China continues to build?

First, the United States must complete the planned modernization of its strategic forces. The risks would become even more dire if America's capabilities were to deteriorate due to obsolescence. Second, the United States should continue to seek trilateral nuclear arms negotiations with Russia and China, even while recognizing that numerical limits will be very difficult to achieve. Third, since augmentation of the Western strategic inventory will presumptively be needed, Washington should encourage the UK and France to commit to expanding their nuclear forces as a part of a shared effort that may be less provocative to Russia and China than a solely American response.

NUCLEAR WEAPONS

Modern thermonuclear weapons use a primary fission detonation to trigger a secondary fusion explosion, a sequence that results in much larger yields than with fission alone. Whereas the World War II Little Boy and Fat Man bombs released 15 kilotons (kt) and 21 kt of TNT

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equivalent respectively, thermonuclear devices have yielded up to 50 megatons. Of note, since the 1970s, massive multimegaton weapons have been superseded by smaller yield devices due to improvements in missile targeting.[1] While many details about the composition of advanced strategic warheads remain classified, the 1999 US Congress Cox Report provided a schematic of a 475 kt W87 thermonuclear device.[2]

Incorporating the Ulam-Teller design, the W87 has a fission trigger comprised of approximately 4 kg of weapons-grade plutonium-239 (WGPu) and a deuterium-tritium accelerator. The adjoining fusion device is comprised of about 20 kg of weapons-grade uranium-235 (WGU), along with an unspecified amount of lithium deuteride (LiD). These materials are enclosed in a uranium (usually nonfissile U-238) tamper in order to hold them in place for the secondary fusion explosion involving deuterium (in the form of D-) and tritium (emerging from rapid fission of Li^{+}). In actuality, roughly half of the yield of a fusion weapon actually derives from fission, as the fusion reaction feeds back to drive the Pu-239 and U-235 fission reactions significantly further than they would go on their own.[3]

ARMS CONTROL TREATIES, WARHEAD INVENTORIES, AND FISSILE MATERIAL STOCKS

For more than fifty years, strategic arms control has restrained the global arms race and drastically reduced the number of deployed nuclear weapons. The success of this process lay in its evolution from a freeze on delivery vehicles to actual reductions of both vehicles and deployed nuclear warheads.[4] In the 1972 SALT I agreement, the United States and the USSR froze their numbers of nuclear triad vehicles (intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missiles (SLBMs), and bombers) with verification based on satellite observation. SALT II was negotiated in the mid-1970s but was never implemented due to the 1979 Soviet invasion of Afghanistan. However, both the United States and the USSR voluntarily recognized the agreement's limitations of delivery vehicles to 2,400 and of multiple independently targetable reentry vehicles (MIRVs) to 1,320. In contrast to delivery vehicles, strategic warheads were not limited by SALT I or SALT II. By 1989, at or near the peak of building for both sides, the United States had 12,780 strategic warheads on 1,903 vehicles while the USSR had 11,540 strategic warheads on 2,488 vehicles.[5]

Over the next three decades, arms reductions were achieved through landmark agreements concurrent with the dissolution of the USSR, the end of the Cold War, and the brief period of cooperation between the United States and Russia that followed. The 1991 START agreement broke new ground by capping deployed strategic warheads at 6,000, reducing delivery vehicles to 1,600, and incorporating on-site inspections. Deployed warhead totals were then further reduced to 2,200 by the 2002 SORT Treaty. Of note, in 2002, the United States withdrew from the Anti-Ballistic Missile Treaty that had been negotiated along with SALT I, on the grounds of countering regional threats from Iran and nonstate terrorist organizations. Still, in 2011, the United States and Russia implemented New START, which brought the permitted number of strategic warheads down to 1,550 deployed, 4,000 deployed plus reserve, and 5,500 deployed plus reserve plus retired. Delivery vehicles were reduced to 700, with

"freedom to mix" whereby the United States and Russia each determined the numbers of ICBMs, SLBMs, and bombers that it wished to maintain. New START also included innovative verification methods such as unique identifying numbers for each delivery vehicle and protocols for displaying destroyed delivery vehicles for satellite observation. While the number of 1,550 represents an almost 90 percent reduction from the numbers of strategic weapons deployed in 1989, reserve and retired warheads are neither dismantled nor destroyed, and can be restored to service within a matter of days to weeks.[6] Also, the verification of warhead stocks remains a complex technical issue which is considerably more challenging than surveillance of much larger-sized delivery vehicles.[7]

Over the past decade, however, arms control has stood at an impasse due to escalating tensions between the United States and Russia. Russia's 2014 seizure of Crimea ended efforts that had been aimed at reducing the number of strategic warheads to roughly 1,000 per side.[8] Furthermore, treaty infringement has been a growing concern. In 2019, the United States withdrew from the 1987 Intermediate-Range Nuclear Forces (INF) Treaty after Russian deployments of banned SS-8 missiles had continued for nearly a decade.[9] In response, Russia withdrew as well, claiming United States violations related to the deployment of missile interceptors in Europe.[10] Thus, New START, after its five-year extension in February 2021, is the world's only extant nuclear arms control agreement. However, on-site inspections have not been held since early 2020 due to the COVID-19 pandemic and then the War in Ukraine, which began with Russia's invasion in February 2022. Moreover, Russia suspended its New START participation in February 2023, in a move denounced by the United States as illegal. While both the United States and Russia still claim to adhere to New START's limits on strategic warheads, the extension will expire in February 2026. Furthermore, according to the treaty's protocol, a second extension is not permissible, meaning that ad hoc arrangements or an entirely new agreement would need to be negotiated in order to maintain the status quo.[11]

In contrast to the reductions that have been made by the United States and Russia, China has steadily been making additions to its strategic weapons forces. China does not disclose specific numbers, but it is believed to be the world's third-largest nuclear weapons power, well behind the United States and Russia but now ahead of Great Britain and France. Recent external estimates of China's stockpile include that of 391 warheads by the independent International Panel on Fissile Materials (IPFM) in 2022,[12] and of 500 warheads by the Federation of American Scientists in 2023.[13]

In the context of its expansion, both China's nuclear weapons doctrine and its projected future force size are controversial. China first proclaimed a policy of "no first use" in the 1960s and has restated this at the UN Security Council as recently as March 2023.[14] If China were to abide by this principle, it would not launch a first strike against an opponent under any circumstances. Beginning in the 1960s, China has also proclaimed a doctrine of "minimal deterrence," in which its overall nuclear forces would be limited to the smallest number needed to deter a first strike by surviving and providing second-strike capability.[15] Since commencing its buildup in the early 2010s, however, China has neither provided future force size estimates that would serve to confirm its intentions nor publicly altered its stated doctrine. Meanwhile, external projections include a 2021 Nonproliferation Policy Education Center (NPEC) estimate

of 1,270 strategic warheads by 2030[16] and a 2022 US Department of Defense (DoD) estimate of 1,000 strategic warheads by 2030 and 1,500 by 2035.[17] The latter figure in particular implies that China is seeking strategic weapons parity with the United States and Russia.

China's opacity about nuclear issues extends to its supplies of fissile materials. The IPFM regularly estimates global stocks of highly enriched uranium (HEU) and reactor grade plutonium (RGPu), providing total figures that include both amounts already incorporated into warheads as well as amounts available for new weapons production. Of note, while the United States, Britain, and France publicly report their stocks of both HEU and RGPu, neither Russia nor China reports HEU.[18] For RGPu, Russia does report its stocks regularly, but China has not done so since 2016.[19] Currently, the IPFM estimates that Russia maintains a large predominance over the United States and all other nations in both HEU and RGPu. The US inventory, while also large, is exceeded in terms of RGPu by Britain and France as a result of their decades-long reprocessing of spent civilian reactor fuel.[20]

China's current fissile stocks can be used to generate an estimate of its overall capacity for making strategic nuclear weapons. Given the requirement for approximately 20 kg of HEU and 4 kg of RGPu needed for conversion to weapons grade uranium and weapons grade plutonium in each thermonuclear warhead, China's 14 MT of HEU and 2.9 MT of RGPu mean that it has enough fissile material to maintain 700–725 such devices.[21] Thus, if the 2023 DoD estimate is correct and China already has 500 strategic warheads, it could only produce about 200 more without expanding its stocks through new production and enrichment.

As with fissile material inventory, China does not provide information about HEU and RGPu generation. If China is making HEU or RGPu, it would join Russia, India, Pakistan, Israel, and North Korea as the only nations known to be currently engaged in one or both of these pursuits.[22] According to the IPFM, China has neither militarily enriched nor generated fissile materials since 1987.[23] Specifically, IPFM analyst Hui Zhang states that China's Lanzhou centrifuge enrichment plant and Heping gaseous diffusion plant switched to civilian purposes in 1987, that plutonium production reactors at Jiuquan and Guangyuan were shut down by 1986, and that reprocessing facilities at Jiuquan and Guangyuan were also closed by 1987. In addition, work on China's subterranean plutonium production plant at Fuling was terminated in 1984, when ". . . about 85 percent of the civil engineering work had been finished and more than 60 percent of the plant equipment had been installed."[24] However, NPEC has challenged this assessment, stating that enrichment facilities at Lanzhou, Hanzhong, and Emeishan have already been switched from production of civilian low-enriched uranium (LEU) to HEU, and that China may also have secretly begun RGPu production at Fuling.[25] According to NPEC, the latter would be of greater concern:

> Although typical thermonuclear weapon designs contain some five or more times as much HEU relative to plutonium, the pacing item for expanding China's arsenal of two-stage thermonuclear warheads would be plutonium, not HEU, for two reasons. First, China already has the capacity to make massive amounts of HEU but relatively no confirmed capacity to make WGPu in reactors dedicated for this purpose. Second, China will likely want plutonium to make

higher yield-to-weight and higher yield-to-volume thermonuclear weapons for intercontinental missiles.[26]

In terms of plutonium production, China will soon have the capacity to add to its fissile stocks using newly constructed fast breeder reactors and reprocessing plants. The former, which are dual-purpose in that they can serve either civilian or military objectives, are cooled by liquid metal rather than water. This method allows for operation without moderators, optimizing the production of Pu-239 from U-238 with high-speed neutrons. Fast reactors are said to breed new fuel when the amount of plutonium generated exceeds the amount of starting fuel consumed. While fast breeder reactors have long been touted as a renewable form of nuclear energy, the West has largely abandoned them due to cost issues and safety concerns.[27] In contrast, Russia continues to pursue the technology, with a BN-800 reactor in operation and a BN-1200 reactor in construction. With Russia's technical assistance, China brought a small-scale research fast breeder reactor online in 2011 and is in the process of constructing and operationalizing two full-scale CFR-600s by 2025. China is also currently building two reprocessing plants with a combined PUREX (Plutonium Uranium Reduction Extraction) capacity of 500 kg Pu annually. Once the entire project becomes fully operational, reprocessing could yield enough WGPu for China to build an additional 100 warheads annually.[28]

Currently, there are no formal international constraints on producing either HEU or RGPu, as efforts to negotiate a proposed Fissile Material Cutoff Treaty (FMCT) remain deadlocked. In 1995, prompted by US president Bill Clinton, the UN Conference on Disarmament commenced discussions. However, for decades, the effort has been blocked on procedural grounds by Pakistan and China.[29] China's concerns are likely related not only to disclosure requirements, but also to the limitations that an FMCT would place on its fast breeder and reprocessing programs. Verification has been another stumbling block, as it would require additional technological innovation, substantial expansion of the International Atomic Energy Agency (IAEA) Safeguards Division, and extensive on-site access to highly sensitive national facilities. Given all of these issues, a draft FMCT is not likely to be realized in the near future.

Just as concerning as fast breeder technology is the possibility of fissile material transfers to China. If these were to take place, Russia would be the most likely source because of its huge stockpiles and its current alignment with Beijing. While the 1970 Non-Proliferation Treaty (NPT) forbids such transfers to non-nuclear weapons states, a loophole exists in that there is no prohibition to receipt by states already possessing nuclear weapons. Russia is currently the world's leading supplier of LEU, accounting for 31 percent of EU supplies and 28 percent of US supplies.[30] Russia also regularly supplies HEU, for commercial reactor and medical uses, to Germany, France, China, and Indonesia.[31] For example, in December 2022, Russia transferred 6.5 MT of HEU which was specified as initiation fuel for the Chinese CFR-600s.[32] This amount, which likely included enough U-238 for 200–300 warheads if diverted for military use, was equal to about half of China's estimated HEU stocks, but only 1 percent of Russia's.

Transfer of RGPu from Russia to China is another possibility. Currently, both Russia and the United States possess sizeable excess supplies of RGPu and WGPu.[33] During their

prior period of cooperation, the two nations signed the 2000 Plutonium Management and Disposition Agreement (PMDA), which specified that each should neutralize 34 MT of WGPu via conversion to mixed oxide (MOX) fuel. However, the agreement broke down in 2016 after the United States abandoned MOX production due to huge cost overruns and Russia suspended its participation in response.[34] While RGPu and WGPu transfers between nuclear weapons states are also not specifically proscribed by the NPT, plutonium stocks are highly controversial in Asia. For decades, Japan has been producing RGPu by reprocessing spent civilian reactor fuel, reaching a current inventory of 46 MT.[35] Japan's reprocessing activities, permitted by treaty with the United States, have inflamed opinion in not only China but also South Korea.[36] Thus, any transfer of RGPu to China would result in considerable outcry. Nevertheless, as analyst Vladimir Marakhonov argues, Russia might consider such an action "if cornered" by a sharply deteriorating international situation.[37]

THE UNITED STATES WILL SOON BE FACED WITH A TRIPOLAR CONUNDRUM

Strategic warhead estimates show that the United States and its allies are on an unsustainable path in terms of nuclear security, principally because the current tripolar great-power competition is fundamentally different from the bipolar Cold War. Currently, the United States, Britain, and France together have 2,185 strategic warheads compared with 2,174 for Russia and China combined,[38] a ratio of 1.01 from the US perspective. However, the predicted 2030 totals are 2,185 to 2,374, a ratio of 0.92, assuming that no nation other than China builds substantially and that China remains limited by its present-day fissile material stocks. Factoring in the expected contribution of China's new fast breeder reactors and reprocessing plants increases the Chinese arsenal by up to 100 more strategic weapons annually for the second half of the 2020s. In this scenario, China would meet the DoD estimate of 1,000 strategic weapons by 2030, and the tally would be 2,185 for the West versus 2,674 for Russia and China together, a ratio of 0.82. Extending this to 2035 would produce totals of 2,185 versus 3,174, a ratio of 0.69, as China reaches the DoD estimate of 1,500 strategic weapons.

Such nuclear inferiority would raise questions of deterrence unlike any the United States has previously faced. During the early Cold War, the United States held a large strategic nuclear advantage over the USSR. For instance, in 1962, the United States had 3,451 strategic warheads compared with 497 for the USSR, a ratio of 6.94. However, as the Soviets accelerated their building, the United States realized that there was no way to escape mutual vulnerability and that an alternative path to deterrence lay in parity.[39] Thus, the United States did not attempt to maintain its large superiority in offensive weapons, and it also negotiated limitations on defensive measures in the 1972 Anti-Ballistic Missile Treaty. By 1989, the ratio dropped to 1.11.[40] With the 1991 START agreement, parity in strategic warheads became established between the United States and Russia, and subsequent treaties maintained this balance while lowering the number of allowed warheads.

Implicitly, the institution of the parity principle constituted a rejection of the alternative approach of "minimal deterrence." According to this theory's proponents, adversaries could

be deterred with a much lower number of offensive weapons. In 1967, when the United States had 6,226 strategic warheads, a DoD study calculated that 400 launch-on-warning devices would provide deterrence through countervalue targeting of the USSR's cities and military production rather than counterforce targeting of Soviet strategic nuclear weapons sites. Specifically, these planners argued that holding at risk 25 percent of the USSR's population and 50 percent of Soviet industrial capacity would suffice.[41] However, pure application of "minimal deterrence" was limited by the possibilities of technical failure of US weapons, attrition by Soviet missile defenses, advances in antisubmarine warfare, and undetected preemptive Soviet attack. Thus, in practice, a successively higher number of weapons was deemed necessary as the USSR enlarged its strategic warhead inventory. In the end, the United States was willing to sacrifice superiority but not parity, and with the latter approach avoided nuclear conflagration while prevailing in the Cold War.

However, the parity-based stability of the bipolar Cold War will most likely not be achievable in the three-way context of great-power competition. From the perspective of game theory, the Cold War was approachable as a two-player contest of mutual mistrust, for which parity and mutual assured destruction provided a solution. As analyst Andrew Krepinevich has pointed out, however, among today's United States, Russia, and China,

> It is simply not possible for each state to maintain nuclear parity with the combined arsenals of its two rivals. Assume, for example, that China deployed the same size nuclear force as Russia and the United States: 1,550 weapons. At that point, U.S. strategists might rationally conclude that they need to add an additional 1,550 weapons to achieve parity with the combined forces of China and Russia. Meanwhile, Russian strategists would likely want the same. China, having established an arsenal on par with the two great nuclear powers, would not be inclined to forfeit its newly won status—and so a tripolar system risks collapsing into . . . [an] arms race, in which parity is continuously sought but never achieved.[42]

In terms of game theory, the presence of a third player vastly complicates matters and creates a problem that is potentially insoluble. This dilemma can be seen in Krepinevich's formulation, where the starting point is three players without specific affinity between any two. Factoring in the de facto alliance between Russia and China, the United States becomes certain to view the situation as 1,550 against 3,100, and to undertake expansion efforts that trigger a spiraling building contest with no end in sight. Perhaps even the peak Cold War levels of roughly 12,000 strategic weapons per side could be exceeded in the years to come.

WHAT THE UNITED STATES SHOULD DO NOW

The present strategic problem stems from an accelerating Chinese nuclear weapons buildup and its alignment with aggressive Russian revanchism. Beijing is poised to launch a new phase of its strategic forces expansion with fast breeder reactors and fissile material acquisitions, while Moscow's military escalations in Ukraine have led to increasing Western arms deliveries to Kiev. In the context of the tripolar conundrum, to which the concepts of parity

and mutual assured destruction cannot be straightforwardly applied, these recent international developments constitute an existential threat to arms control.

What ideas, then, could be advanced as possible solutions to this critical problem? First, the United States must complete its planned nuclear force modernization process. Second, Washington should continue to seek meaningful strategic arms negotiations with Russia, and should also continue to enjoin China to participate. Third, the United States should encourage the UK and France to augment their strategic nuclear inventories, as Anglo-French building is less likely to precipitate an all-out arms race than an exclusively American expansion.

THE NEED TO MODERNIZE US STRATEGIC NUCLEAR FORCES

Many American nuclear weapons are now dated. As the 2022 US Nuclear Posture Review (NPR) states:

> Most nuclear deterrent systems are operating beyond their original design life. Replacement programs are on track at this time, but there is little or no margin between the end of effective life of existing systems and the fielding of their replacements. These replacement programs are planned to deliver modernized capabilities to avoid any gaps in our ability to field a credible and effective deterrent.[43]

Since the 1980s, the mainstay of the US nuclear triad has been SLBMs, which are also newer than most American ICBMs and bombers. The current US SSBN force is comprised of fourteen *Ohio*-class submarines, twelve of which are active at any one time with the remaining two in maintenance.[44] Built between 1976 and 1997, the *Ohio*-class vessels are scheduled for replacement by *Columbia*-class SSBNs between 2031 and 2050.[45] The second-largest leg of the US triad, ICBMs, is currently comprised of prior generation weapons. With the implementation of New START in 2011, the United States retired its entire complement of MIRVed LGM-118 Peacekeeper ICBMs, built between 1984 and 1998. This left 400 single-warhead LGM-30 Minuteman III missiles as the United States chose to de-MIRV the more targetable ICBMs rather than the less vulnerable SSBNs. The Minuteman III's were produced between 1968 and 1975,[46] and have already undergone life extension programs. Current plans are to replace these missiles with GBSD Sentinel LGM-35 ICBMs between 2029 and 2036.[47] The third and smallest leg of the US triad is the bomber force, which currently includes forty B-52 bombers, built in the 1960s and armed with AGM-86 air-launched cruise missiles designed to be fired from several hundred miles outside enemy borders. In addition, the United States has twenty recent model B-2 stealth bombers which, in contrast to the B-52s, are able to pierce enemy air defenses to drop gravity bombs.[48] The aged B-52s are scheduled to be replaced by sixty new enhanced stealth B-21 Raiders beginning in 2025.[49]

In addition to building new launchers, the United States needs to reexpand its capacity to maintain and update warheads, including their primary fission and secondary fusion components. As part of the Production-based Resilience Program, the Department of Energy's National Nuclear Security Administration (NNSA) is in the process of initiating fission pit

production at the Savannah River site in South Carolina as well as upgrading production at Los Alamos National Laboratory.[50] This capacity is needed because the contaminated Rocky Flats facility in Colorado has been shut down since 1989. While uranium pits are relatively stable, the chemistry and physics of plutonium remain poorly understood and the operational lifetime of a plutonium pit can only be imprecisely estimated.[51] At present, US pit production involves the recycling of previously produced plutonium rather than new reactor-based plutonium production.[52] By 2030, the NNSA plans to produce fifty pits per year at Savannah River and thirty per year at Los Alamos, compared to the current capacity of only five per year at the latter. Also, the NNSA is expediting construction of a Uranium Processing Facility to replace the World War II–era plant in Oak Ridge, as well as continuing tritium production at Savannah River.

TRILATERAL ARMS CONTROL

Even with the tripolar conundrum, the United States remains legally obligated to pursue arms control, and recent presidential administrations have maintained this responsibility. The United States, as a nuclear weapons state signatory of the NPT, is committed to participation in ongoing arms reduction discussions. According to the treaty's Article VI:

> Each of the Parties . . . undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control.[53]

The NPT was permanently extended in 1995, and thus the United States will remain mandated to pursue arms limitations and reductions regardless of international circumstances.

Indeed, the Trump and Biden administrations have made appropriate efforts to advance arms control. In May 2019, the United States offered to incorporate China into discussions between Washington and Moscow.[54] However, China's response was negative. In February 2020, Fu Cong, director-general of China's Foreign Ministry Department of Arms Control said,

> The Chinese side has an order-of-magnitude difference in nuclear forces from that of the U.S. and Russia. . . . It is neither fair nor reasonable to encourage the Chinese side to join trilateral arms control negotiations. As countries with the largest nuclear arsenals, the U.S. and Russia should earnestly fulfill their special responsibility for nuclear disarmament, and work toward the extension of the New START Treaty and further slash their nuclear arsenals, so as to create conditions for other nuclear-weapons states to join the nuclear disarmament negotiations.[55]

For its part, Russia has acknowledged China's position. As Russian foreign minister Sergei Lavrov said, also in February 2020,

> The Americans are constantly trying to impose on us an option involving China's accession to the debate. . . . But China has repeatedly stated in public that it will not join these talks because

> the structure of its nuclear forces is radically different from that of Russia and the United States. In terms of numbers, these forces are also a far cry from the level where China would be ready to talk of some balance. If China suddenly changes its mind, we will be pleased to participate in multilateral talks. But we will not try to convince China.[56]

Nevertheless, the Biden administration has rightly pledged to continue the process, more recently shifting to nonnumerical goals. As the 2022 NPR states: "PRC and Russian actions . . . make mutual and verifiable arms control challenging, but the United States will prepare for engagement and realistic outcomes in dialogues with both governments."[57] At present, behavioral measures may be the best that can be achieved. According to analysts Ulrich Kuhn and Heather Williams,

> The United States should try to encourage responsible behaviors and help stigmatize irresponsible ones. Responsible behaviors include transparency about nuclear arsenals, risk reduction efforts, crisis communication channels, and restraints on potentially escalatory activities.[58]

Kuhn and Williams also recommend efforts to announce upcoming missile tests in advance, to reduce the alert status of nuclear forces, and to promulgate initiatives in new areas such as cyberweapons and artificial intelligence. Another example of this type of agreement is the November 2022 G-20 summit statement which proclaimed, "The use or threat of use of nuclear weapons is inadmissible. The peaceful resolution of conflicts, efforts to address crises, as well as diplomacy and dialogue, are vital. Today's era must not be of war."[59]

HOW SHOULD THE UNITED STATES AND THE WEST MAINTAIN PARITY WITH RUSSIA AND CHINA?

As was the case during the latter part of the Cold War, American nuclear strategy in the great-power competition is based on the parity principle. However, given the tripolar conundrum, the United States should consider various means of achieving parity, including not only a solely American expansion but also a shared effort with allies that might be less provocative to Russia and China. In the past year, high-level US strategic reviews have supported nuclear weapons expansion as a response to China. In the spring of 2023, the Lawrence Livermore National Laboratory's Center for Global Security Research (CGSR) published a report titled "China's Emergence as a Second Nuclear Peer." Regarding strategic forces, the report stated,

> The United States should upload [i.e. convert from reserve or retired to deployed status] weapons once it is no longer bound by the constraints of the New START Treaty, presumably in February 2026. . . . Between now and 2026, the United States should exercise and demonstrate the ability to upload bombers, ICBM's and SLBM's as a signal of its ability and intent to meet its deterrence and assurance requirements.[60]

Similarly, in its October 2023 Final Report, the US Congressional Commission on the Strategic Posture of the United States stated,

The following strategic nuclear force posture modifications should be pursued with urgency:

- Prepare to upload some or all of the nation's [reserve] warheads
- Plan to deploy the Sentinel ICBM in a MIRVed configuration . . .
- Increase the planned number of B-21 bombers . . .
- Increase the planned production of *Columbia* SSBN's and their Trident ballistic missiles.[61]

Like the CGSR recommendations, these measures would necessitate withdrawal from New START if implemented at the present time.

A substantial US uploading program risks a destabilizing response from China and Russia according to the model of tripolar instability. However, their decision-making might differ if they were to perceive the West as multiple actors rather than as a single unified force. As the UK and France both maintained arsenals of 500 or more nuclear weapons during the Cold War, it is worthwhile to consider an alternative program incorporating significant British and French building rather than a solely American effort.

The UK, which has historically been a maritime power without land-based nuclear missiles, could be approached to expand its SSBN force. At present, the Royal Navy has four *Vanguard*-class SSBNs that rotate with three in active service and one in maintenance.[62] Each British SSBN has sixteen Trident II missile tubes, but only ten to twelve of these are currently in operation. The missiles are MIRVable to eight, but currently carry only four warheads. Thus, an expansion from 120–144 warheads to 384 is feasible through full tube loading. Further increases would require additional SSBN construction. The *Vanguard*-class vessels are also scheduled for replacement with new *Dreadnought*-class SSBNs beginning in the early 2030s.

France, which previously possessed land-based nuclear missiles during the Cold War, might be amenable to restoring these as well as building up its SSBN force. Like the UK, France maintains a rotating force of four SSBNs.[63] Each of the French *Triomphant*-class boats has sixteen launchers for M51 missiles, MIRVable to six and currently utilized to five. Thus, significant SLBM expansion would require new construction. France is also planning to introduce the new SNLE-3G class SSBM in 2035. In 1996, France deactivated its force of eighteen S3 intermediate-range land-based missiles capable of striking the European portion of Russia. Restoration of a French intermediate-range ground weapon could again deter Russia, but true strategic missiles with ranges of 7,500–10,000 km would be needed to target China's ICBM silos.

The outcomes of a shared allied building program would depend on Russian and Chinese perceptions, which are likely to be different from those provoked by US building. If China does indeed reach 1,500 strategic weapons by 2035, the UK and France could potentially increase their arsenals to 750 each during this time. To Russia and China, this might be

preferable to a United States armed with 3,000 strategic thermonuclear devices. And, if Moscow and Beijing were content to remain at 1,500 each and 3,000 total, a new quadripolar balance would become established at a 1:1:1:1 ratio, with the UK and France together representing the fourth pole. Of course, US planners would need to accept codependence with the UK and France, and to forego additional building. This would represent a new application of the Cold War–derived principles of parity and mutual assured destruction, relying to an unprecedented degree on allied forces in an attempt to solve the tripolar conundrum. In this fashion, the rise of China could be accommodated, and arms control might be resuscitated from its currently forlorn state.

CONCLUSION

At present, though, New START is doomed, and Washington must be prepared to face the reality of a world without arms control. New START would be the third and last major agreement to fail, after the Anti-Ballistic Missile Treaty of 1972–2002 and the INF Treaty of 1987–2019, in a sobering conclusion to over fifty years of limitation and reduction efforts. What would be lost, according to former US Undersecretary of State Rose Gottemoeller, is predictability as well as the consequent capacity of participating nations to set aside worst-case scenarios and to refrain from unrestrained building.[64] Furthermore, the greater the quantities of arms produced in an all-out nuclear competition, the higher the risk of nuclear conflagration.

No clear-cut solution is yet apparent for this central problem of the great-power competition, but the United States should begin with the approaches detailed above. Effective modernization of American strategic nuclear forces will preserve much-needed deterrence capabilities. Continued attempts at negotiation will fulfill US obligations under the NPT and provide an offramp for Russia and China should one or both nations decide to seek accommodation. Finally, encouraging the UK and France to together become a fourth nuclear pole might be a way to avoid an uncontrolled arms race even as China builds to the New START limit.

Perhaps it can still be hoped that the global inventory of strategic nuclear devices will not return to the stratospheric levels of the 1980s and 1990s. And that the great-power competition can be managed, as the Cold War was, without a nuclear apocalypse. And lastly that the desire for peaceful coexistence will prevail and bring back numerical arms control in the not-too-distant future.

NOTES

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