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HOW TO ADDRESS ALL NUCLEAR WEAPONS?

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Introduction

Since their total number peaked in 1987, global nuclear arsenals have numerically declined to about 13,000 warheads worldwide. However, the remaining nuclear weapons in the hands of nine nuclear-weapon states are still a global threat and a non-proliferation challenge.[1] According to the Stockholm International Peace Research Institute (SIPRI), at the start of 2024, the nine states with nuclear weapons – the United States, the Russian Federation, the United Kingdom (UK), France, China, India, Pakistan, the Democratic People's Republic of Korea (DPRK, or North Korea), and Israel – together possessed a combined total of approximately 12,100 nuclear weapons, of which 9,600 are in active military stockpiles and considered to be operationally usable.[2] The United States and Russia each deploy 1,500-1,800 strategic warheads (warheads on deployed strategic ballistic missiles plus air-launched cruise missiles and gravity bombs at bomber bases readily available for strategic bombers). They are supplemented by reserve strategic warheads and non-strategic (or tactical) nuclear weapons. Moreover, the United States and Russia each have a substantial number of nuclear weapons that have been retired from active stockpiles but remain intact as they await dismantlement.

At present, it is difficult to be optimistic about the near-term prospects for further nuclear arms reductions. The strategic dialogue between the United States and Russia has broken down, China is expanding its nuclear arsenal as are some smaller nuclear-armed states, and the global geopolitical climate does not appear conducive to arms control progress. Quite the opposite, the world is witnessing a nascent nuclear arms race. These factors together threaten greater instability, growing nuclear risk, increasing military expenditures and the increased possibility of further nuclear arms proliferation.

While acknowledging the current difficult prospects for arms control, it nevertheless makes sense to continue thinking about how arms control might contribute to strengthened global stability and security in order to have ideas in hand if/when there is again a basis for cooperative efforts to control and reduce nuclear arms. To date, nuclear arms control has been largely a bilateral matter between the United States and the Soviet Union/Russia and limited to deployed strategic offensive arms and intermediate-range missiles, though there have been important multilateral arms control agreements such as the 1970 Nuclear Non-Proliferation Treaty (NPT) and the 1996 Comprehensive Nuclear Test Ban Treaty (CTBT). It is worthwhile thinking about how a restored arms control process might in the future be expanded to include all types of U.S. and Russian nuclear weapons and eventually the nuclear weapons of all nuclear-armed states.

To do this, it is important to understand the status of the global nuclear stockpiles in order to start thinking about the different categories of nuclear weapons that might be subject to future control and reductions. Information about the global stockpile can be gleaned from a variety of publicly available sources. The significant decline in the total number of global nuclear warheads since 1987 is due largely to decisions by Washington and Moscow to retire and dismantle large numbers of their nuclear warheads, including in the context of the 1991 Strategic Arms Reduction Treaty (START I) and the 2010 New Strategic Arms Reduction Treaty (New START). The United Kingdom and France have reduced their nuclear arsenals as well from Cold War levels, but other nuclear-weapons states are increasing their arsenals, and the United States and Russia are considering producing new nuclear warheads and/or potentially uploading additional nuclear warheads on to their current strategic delivery systems.* The availability of reliable information on the status of the nuclear stockpiles of the UN Security Council Permanent Five nuclear-weapon states varies considerably. In some cases, estimates can be based on declarations, for example, those made by the U.S., Russian, and British governments or by scientific institutions in the past. In other cases, estimates are based on the amount of fissile material – plutonium and highly enriched uranium – that a country is assessed to have produced and on observations of its nuclear, particularly missile, forces.[3]

This paper argues why nuclear arms control is more necessary than ever for international security, describes the challenges and approaches to address all types of nuclear weapons and involve all nuclear-weapons states,

* "Uploading" refers to the practice of placing strategic warheads on intercontinental ballistic missiles and submarine-launched ballistic missiles that carry fewer warheads than their capacity, in many cases because they previously were "downloaded," that is, warheads were removed from the strategic ballistic missiles.

and offers near-term recommendations for building greater confidence and transparency while reducing nuclear risk.

Why Pursue Nuclear Arms Limitations and Reductions? The Challenges

Arms control offers a mechanism to control the nuclear competition between states that are strategic adversaries. Specific reasons to continue with nuclear arms control and reductions of nuclear warheads include: to bolster strategic stability (that is, to enhance a situation in which nuclear-weapons states have no incentives to use nuclear weapons, even in an intense crisis), manage nuclear competition (particularly among states that have difficult political relationships), reduce nuclear risk and the nuclear threat, enhance transparency and predictability (which, among other things, can reduce the need for worst-case assumptions that can lead to decisions to increase nuclear force levels), achieve cost savings, and support the NPT regime. Moreover, the nuclear-armed states recognized by the NPT – the United States, Russia, China, United Kingdom, and France – are obligated by the treaty to engage in good faith negotiations to end the arms race and achieve disarmament.

Bilateral nuclear arms control arrangements between the United States and Russia are eroding. Since Russia rejected a 2013 U.S. offer to negotiate a further one-third reduction in deployed strategic nuclear weapons below the levels mandated by the New START Treaty, Washington and Moscow have not engaged in sustained talks on nuclear arms control. In 2014, the United States charged that Russia had violated the 1987 Intermediate-Range Nuclear Forces (INF) Treaty by testing the 9M729 ground-launched cruise missile at ranges prohibited by the treaty. Russia's offers to resolve the U.S. concern did not suffice, and the United States withdrew from the treaty in 2019 (at the time, U.S. military officials also were interested in conventionally-armed intermediate-range missiles, particularly as a means to counter Chinese capabilities in east Asia). Russia subsequently withdrew from the treaty as well.

In early 2022, following Russia's invasion of Ukraine, Washington paused strategic stability talks with Moscow. In 2023, Russia "suspended" implementation of the New START Treaty, and the United States reciprocated by ceasing to implement the treaty's verification provisions, although both parties to date have declared that they continue to observe the treaty´s three numerical limits. Russia has declined to take up a June 2023 U.S. offer to engage in talks "without precondition" on a post-2026 nuclear arms control framework (New START expires by its terms in February 2026). The negotiation of a follow-on treaty to New START in the near term appears unlikely.[4]

New START covers the most devastating U.S. and Russian nuclear systems: deployed strategic warheads, deployed intercontinental ballistic missiles (ICBMs) and submarine-launched ballistic missiles (SLBMs), deployed and non-deployed heavy bombers equipped for nuclear armaments, and deployed and non-deployed launchers for ICBMs and SLBMs. However, New START's limits left many nuclear weapons unaddressed; the treaty did not capture all bomber weapons, reserve (non-deployed) ICBM and SLBM warheads, non-strategic (sometimes referred to as tactical) nuclear weapons, non-deployed ICBMs and SLBMs, or new kinds of strategic delivery vehicles.

The United States and Russia are each modernizing their nuclear forces, and China is assessed to be on the cusp of a significant expansion over the next decade, from 500 warheads to 1,000 warheads in 2030 and perhaps 1,500 in 2035.[5] France and the United Kingdom are investing in their strategic ballistic missile submarines (SSBNs). Each country maintains four SSBNs, with a total of 290 (France) and 225 (UK) warheads in their arsenals.[6] India, Pakistan, and North Korea are believed to be adding to their smaller nuclear arsenals, albeit at different rates.

To date, most nuclear arms limitations and reductions have been a bilateral U.S.-Russian enterprise. Other nuclear-weapons states (NWSs) do not participate, and verification regulations beyond the bilateral U.S.-Russian context have not been elaborated.

Over the past decade, some initiatives have been launched to involve more states in foundational aspects of the nuclear disarmament enterprise. In 2014, the U.S. State Department and the Nuclear Threat Initiative initiated the "International Partnership for Nuclear Disarmament Verification" (IPNDV), in which 25 states cooperate in technical working groups to develop the technical foundations for future nuclear disarmament verification.[7] The scope of work ranges from innovative technological methods to the concrete

organization of inspection exercises and declarations, the training standards for international inspectors, and future disarmament scenarios.

The United Nations Security Council Permanent Five (UNSC P5) reporting and transparency process in the framework of the NPT is ongoing, but still not sufficient and structured. It should become more standardized and regular and include comparable data. The Non-Proliferation and Disarmament Initiative (NPDI) has elaborated concrete proposals to enhance transparency through reporting.[8] A standard template can be developed.** That process is not sufficient in the eyes of the non-nuclear weapons states. The United States has provided declassified information on the U.S. nuclear weapons stockpile in 2017 and 2021.[9]

Some NWSs have accepted transparency and inspection measures (New START, the International Atomic Energy Agency's Trilateral Initiative), but others have different transparency cultures and policies. For example, some fear that transparency could increase their exposure to a first strike and believe that opacity bolsters their nuclear deterrent. China seems a case in point, apparently believing that greater transparency regarding its nuclear forces could make them more vulnerable to a theoretical first strike by the United States. The planned Chinese nuclear silos build-up is understood as decreasing Chinese nuclear vulnerability, but this should also make reporting of Chinese modernization efforts more possible. Broader participation in transparency would show the will of NWSs to move toward their NPT Article VI obligations.

The challenge of addressing "all" nuclear weapons requires: (1) covering all types of nuclear weapons (including those that are non-deployed and placed in national-level storage) and (2) broadening nuclear arms control efforts beyond the United States and Russia to other states with nuclear weapons.

Nuclear disarmament ultimately requires the concrete and verifiable irreversible reduction, dismantlement, destruction, or elimination of nuclear weapons from a national military nuclear arsenal. The current reductions and the elimination of retired nuclear warheads and their sub-components has so far been organized and executed by the NWSs on their national basis.[10] In the case of far-reaching nuclear disarmament arrangements, however, the irreversible elimination of nuclear warheads, mission-critical facilities, and/or weapons-grade material (i.e., first and foremost, plutonium and highly enriched uranium) creates new technical, legal, and economic challenges. An additional challenge for sustainable nuclear disarmament is also to prevent states from rearming by activating hidden arsenals or by relaunching a military nuclear program.[11]

Approaches to Addressing Nuclear Weapons

The **most ambitious approach** for addressing all nuclear weapons and warheads would seek an agreement between the United States and Russia and eventually other NWSs that covers all nuclear warheads. That requires addressing several key issues, including the following:

Definitional challenges for nuclear warheads: What is a nuclear warhead? Technically, a nuclear warhead is a military device consisting mainly of nuclear fissionable material, conventional explosives and electronics in a configuration capable of producing a nuclear explosion. Ideally, addressing all nuclear warheads would capture strategic, non-strategic, operational, deployed, non-deployed, spare, reserve, stored and dismantled warheads. It would also be necessary to define the boundaries of the definition for a "nuclear warhead" within the warhead lifecycle of a nuclear-weapon state: at what point in the production cycle is there a warhead by agreed definition, and at what point in the dismantlement cycle is it eliminated, becoming a set of components.

** The "chair of the Working Group on further strengthening the review process" proposed a number of items such as "plans related to the modernization of nuclear weapons, and related changes to their nuclear capabilities; the number, type (strategic or non-strategic), and status (deployed or non-deployed) of nuclear warheads; the number and type of delivery vehicles; the measures taken to reducing the role and significance of nuclear weapons in military and security concepts, doctrines and policies; the measures taken to reduce the risk of unintended, unauthorized or accidental use of nuclear weapons; the measures taken to de-alert or reduce the operational readiness of nuclear weapons systems; the number and type of weapons and delivery systems dismantled and reduced as part of nuclear disarmament efforts; the amount of fissile material for military purposes." Preparatory Committee for the 2026 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, 3 August 2023 NPT/CONF.2026/PC.I/WP.34, item 16.

To date, U.S. and Soviet/Russian nuclear arms agreements have limited only deployed strategic warheads or warheads attributed to strategic delivery systems. For example, the New START Treaty limits the number of strategic warheads on deployed ICBMs and SLBMs and attributes one strategic warhead to each deployed heavy bomber equipped to carry nuclear armaments so that neither side shall have more than 1,550. When a warhead is removed from a deployed ICBM or SLBM, it is no longer counted under New START and is not constrained in any way.

The 1987 Intermediate-Range Nuclear Forces (INF) Treaty required that the United States and Soviet Union eliminate all ground-launched ballistic and cruise missiles with ranges between 500 and 5,500 kilometers. While the treaty required the elimination of the front sections of the missiles, it did not require the elimination of the nuclear warheads associated with those missiles.

Delivery systems: Strategic delivery systems such as heavy bombers and long-range missiles in silos or on mobile launchers (ICBMs) or on board submarines (SLBMs) are used to deliver nuclear warheads to a specific target, usually at intercontinental ranges. Bilateral nuclear arms control treaties between the United States and Soviet Union/Russia originally focused on limiting strategic delivery systems and launchers, later adding limits on attributable strategic warheads and deployed strategic warheads. A baseline notification about the number and status of delivery systems was first required by the INF Treaty and START I.

U.S.-Soviet/Russian bilateral nuclear arms control treaties have treated all ICBMs and SLBMs as carriers of nuclear warheads. START I and New START allowed the sides to take certain steps to convert heavy bombers so that they would be considered carriers of conventional weapons only.

Key new elements for consideration in a New START follow-up process are newly deployed "aeroballistic" systems that are launched as ballistic missiles and then manoeuvre to the target as a ballistic unmanned aircraft (sometimes referred to as post-boost glide vehicles). Long-range cruise missiles, nuclear powered and nuclear-equipped underwater torpedoes, and fractional orbital bombardment systems also fall in the category of strategic delivery systems with a nuclear payload.

A challenge for verification, if a future treaty is to limit nonstrategic nuclear weapons, would be how to address dual-capable delivery systems which could be equipped with nuclear or conventional warheads. For example, many U.S. F-16, F-15E, and F-35 fighter aircraft are dual-capable in that they are wired to carry nuclear weapons as well as conventional weapons. Russia has a plethora of dual-capable systems, including the Iskander ground-launched missile, Su-24, Su-34 and Mig-31K fighter aircraft, and ship-borne cruise missiles.

So, key questions regarding delivery systems for a future treaty or framework of treaties are:

- Whether and how to deal with delivery systems for non-strategic nuclear warheads, many of which would be dual-capable?
- In addition to including traditional strategic delivery vehicles (ICBMs, SLBMs, heavy bombers), how to deal with new kinds of strategic delivery systems such as Russia's Burevestnik ground-launched, nuclear-powered, nuclear-capable cruise missile? While New START provides that the treaty's Bilateral Consultative Commission should address the question of new kinds of strategic delivery systems, the Commission is not meeting given New START's suspension. Moreover, a new agreement will have to be clear about new kinds of strategic systems that have been developed and deployed since New START was negotiated.
- How might parallel processes, e.g., conventional arms control negotiations, address dual-capable delivery vehicles of concern?

Understanding verification requirements and capabilities is important for arms control agreements, because such treaties can be undermined if compliance with reductions and limitations cannot be adequately verified. Functioning verification allows state parties to treaties to assess the implementation of an agreement, thus fostering trust and confidence between state parties. More concretely, "effective" verification measures discourage non-compliance with treaty provisions and can give timely warning of violations. In sum, if working, verification measures can create confidence that a treaty regime is functioning as intended and that state parties are in compliance with an international agreement. This is not only in the interest of all state parties but can also

be an important instrument to solve emerging issues and conflicts. In 2010, Fetter and Oelrich stated the obvious: "Most nuclear-weapon states would be willing to eliminate their nuclear weapons only if they could be confident that other countries – especially potential adversaries – had also eliminated theirs."[12]

Verification standards: What are the technical and procedural challenges for effective verification?*** These challenges are more difficult for limits on warheads that are in storage and not associated with deployed delivery systems (as are deployed strategic warheads under New START). The state parties would have to agree on what declarations, notifications, inspections, tagging, etc. would be necessary for the sides to have confidence in their ability to detect cheating. Here, the following challenges emerge:

- What procedures and technologies could be used from previous arms control and confidence- and security-building agreements (inspectors, certified equipment, experiences from New START and INF treaties, the 1992 Open Skies Treaty, 1990 Treaty on Conventional Armed Forces in Europe, 1972 U.S.-Soviet Incidents at Sea Agreement)?
- What experience could be extracted from past U.S.-Russian lab-to-lab cooperation for these purposes? Could such cooperation be restored, for example, on joint work to make the elimination of nuclear warheads irreversible, and with what specific set of participants?
- What might be drawn from other verification initiatives such as the Trilateral Initiative and the International Partnership for Nuclear Disarmament Verification?

A **more practical approach** than one addressing all nuclear weapons systems at once could aim to address various categories of nuclear warheads, in separate agreements, perhaps sequentially. The advantage of pursuing more incremental measures would be to address immediate threats to strategic stability and at the same time facilitate the negotiating process, establish and hone sustainable procedures for the future, and to build institutional support inside the involved governments. Such an approach could entail:

- **Limits on strategic nuclear forces**: Restoration of full functioning of New START with a negotiation of a follow-on agreement that would cover deployed strategic warheads (perhaps including warheads in storage areas at bomber bases), "traditional" strategic delivery systems (ICBMs, SLBMs, and heavy bombers), and new kinds of strategic delivery systems.
- **Limits/ban on intermediate-range missiles in Europe:** Build on the 2020 Russian proposal for a ban on intermediate-range missiles in Europe and the January 2022 U.S. and NATO responses to the draft U.S.-Russia and NATO-Russia agreements proposed by Russia in December 2021. (A ban may be increasingly difficult as Russia continues to deploy the 9M729 while maintaining that it is not an intermediate-range missile, and the U.S. Army has begun to deploy the Typhon missile system with ground-launched cruise missiles and SM-6 missiles capable of intermediate ranges.)[13] Intermediate-range systems should be considered regardless of type of payload (conventional or nuclear). An additional question is whether the agreement should include air- and sea-launched intermediate-range systems, even if under different limitations. Other options are to include locational restrictions on the nuclear warheads associated with such systems to lessen the possibility of a prompt short-time attack, or to ban the deployment of nuclear warheads on these systems with appropriate verification provisions to verify compliance.
- **Limits on "forward-based" nuclear warheads:** Negotiate locational and/or numerical limits on U.S. B61 bombs in Europe and on comparable (to be defined) Russian nonstrategic nuclear warheads in base-level storages west of the Urals. The ultimate option here might include withdrawal of all relevant nuclear weapons to national territories and their placement only

*** "Effective verification" as defined Paul Nitze means a situation in which if one side "moves beyond the limits of the treaty in any militarily significant way, [the other side] would be able to detect such violation in time to respond effectively and thereby deny the [violating] side the benefit of the violation." Effective verification does not require that any and every violation of a treaty be detectable.

in central national-level storage facilities, with verification of their absence at forward bases. This would face both technical (verification) and political challenges.

Approaches for Formats that include Additional, if not all, Nuclear Weapon States

Negotiations on limiting and reducing nuclear arms have been a bilateral matter between the United States and the Soviet Union (Russia, following the collapse of the Soviet Union in 1991). For some 70 years, the nuclear arsenals of the two nuclear superpowers dwarfed those of the other nuclear-weapons states – for most of that period, by a factor of ten to one or far greater.

However, as noted earlier, the size of nuclear arsenals appears to be changing. China, which for years maintained a relatively small nuclear force, has embarked on a significant expansion, including by building some 350 new ballistic missile silos. The Chinese arsenal as of 2024 was estimated to include 500 nuclear warheads, with that number projected to rise to 1,000 by 2030 and perhaps 1,500 by 2035 as China builds a modern strategic triad of ICBMs, SLBMs, and nuclear-capable bombers.[14]

The Pentagon is increasingly concerned about the prospective challenges of dealing with and deterring two nuclear peer competitors – Russia and China. Washington for several years has sought to engage China in nuclear arms control discussions. While U.S. and Chinese security experts met in November 2023, Beijing has shown no interest in a continuing bilateral dialogue with Washington and no interest in a trilateral format that would include Russia. In the Strategic Arms Limitation Talks and Intermediate-Range Nuclear Forces negotiations in the 1960s, 1970s, and early 1980s, Moscow attempted to address or receive compensation for British and French nuclear forces but ultimately dropped that demand. Recently, however, Russian officials have revived their position that British and French nuclear forces must be addressed, too.

If there is to be a multilateral format, one involving all five countries seems more likely than one just involving the United States, Russia, and China. One already exists. The United States, Russia, China, the United Kingdom, and France – the five permanent members of the UN Security Council, which are also the five nuclear-weapons states formally recognized by the NPT – launched a multilateral discussion process in 2009 on nuclear weapons issues. The first five years of meetings focused on three issue areas: developing a glossary of nuclear terms, verification and monitoring provisions, and developing transparency measures, including on their nuclear arsenals.[15]

In January 2022, the UNSC Permanent Five issued a joint statement on "preventing nuclear war and avoiding arms races," in which they affirmed that "a nuclear war cannot be won and must never be fought," that they remain committed to their NPT obligation to pursue nuclear disarmament, and that their nuclear weapons are not targeted at any state.[16] The process has not been disrupted by the Russia-Ukraine war, as have bilateral U.S.-Russian exchanges. However, the five have not used this process to explore serious limits on or reductions in nuclear weapons levels and do not seem to believe that is its purpose. The discussions of transparency measures and nuclear doctrines have produced

Country	*Deployed Strategic*	*Reserve/Nondeployed*	*Military Stockpile*
Russia	*1,710*	*2,670*	*4,380*
United States	*1,770*	*1,938*	*3,708*
China	*24*	*476*	*500*
France	*280*	*10*	*290*
United Kingdom	*120*	*105*	*225*
Pakistan	*0*	*170*	*170*
India	*0*	*172*	*172*
Israel	*0*	*90*	*90*
North Korea	*0*	*50*	*50*

Table 1: Estimated Nuclear Weapons Numbers, 2024[25]

meager results, but it is a useful channel for dialogue with potential to be more productive and ambitious in the future.

For most of the nuclear era, strategic stability has been assessed solely between the United States and the Soviet Union/Russia. Beginning in the early 1960s, Washington and Moscow began deploying survivable strategic delivery systems (ICBMs in hardened silos, SLBMs on ballistic missile submarines, and, much later, mobile ICBMs). The situation was seen as stable in that both countries had nuclear forces capable of surviving a large first strike with the ability to deliver a devastating counterstrike against the attacker. Such a situation greatly reduced the incentives on either side to use nuclear weapons, even in an intense crisis.

However, strategic stability calculations are becoming more difficult. Third-country nuclear forces, particularly those of China, are increasingly a factor that must be considered, so the stability model no longer involves just two actors. Moreover, developments in missile defense and long-range precision-guided conventional strike will figure in stability estimates, and countries will undoubtedly consider the impact of developments in the space and cyber domains, including artificial intelligence. As a result, a two-player model focused on strategic offensive nuclear arms must be replaced by a model with multiple players and multiple domains.

Negotiating formats: Depending on which nuclear-weapons states were prepared to engage, a variety of negotiating formats can be envisaged for negotiating and agreeing upon limits on, reductions in, or confidence-building and risk reduction measures regarding nuclear weapons.

One option would entail a U.S.-Russia negotiated agreement limiting their nuclear forces, with China, the United Kingdom, and France in parallel adopting unilateral constraints on their nuclear force numbers. The U.S.-Russia agreement would be a follow-on to the New START Treaty. While neither side now is implementing the treaty's data exchange, notification, and on-site inspection measures, both assert that they are observing the treaty's three numerical limits. However, New START expires by its terms in February 2026.

In this option, the United States and Russia would conclude a new nuclear arms agreement, ideally capturing all their nuclear weapons – strategic, non-strategic, deployed, non-deployed – with a full set of monitoring measures appropriate for verifying compliance with the agreed limits. China, the United Kingdom, and France would adopt unilateral constraints that would cap their total number of nuclear weapons (at equal or unequal levels) and adopt transparency measures that would provide a degree of confidence that they were observing those limits. This option would center on a U.S.-Russian negotiation with a parallel but less formal negotiation among the five countries, though it could have little appeal to China given the evident scale of China's assessed nuclear build-up.

A second option would entail a full negotiation among the UNSC Permanent Five that would aim to conclude a single multilateral agreement that limited the nuclear forces of all five states, with appropriate monitoring and verification measures. For reasons discussed below, this would be a far more complex process than a bilateral U.S.-Russian negotiation and unlikely to succeed. It might be easier for the five to begin with a discussion of risk reduction, confidence-building, and transparency measures.

China's calculation of its nuclear force almost certainly takes account of the nuclear forces of India. Thus, a third option – even more complex – would bring India and Pakistan into a seven-party negotiation (neither India nor Pakistan has signed the NPT).

Addressing the nuclear forces of the two remaining nuclear-weapon non-NPT states poses special challenges. While it is widely assumed that Israel has nuclear arms, Israel has never officially admitted to possessing them. As for North Korea, the international goal to date has been to achieve North Korea's denuclearization; including North Korea in a multilateral nuclear-weapons state negotiation presumably would require that countries such as the United States, Japan, and South Korea accept North Korea's nuclear status.

In any negotiation – bilateral U.S.-Russian or multilateral – the question of which nuclear arms to include would arise. Eight of the nuclear-weapons states (all but the United Kingdom) have nuclear weapons that can be delivered by delivery systems that are not "strategic" delivery systems as defined by the New START Treaty (ICBMs, SLBMs, or heavy bombers equipped for nuclear armaments). A strategic-only approach would omit Pakistan and Israel, with India and North Korea possessing nascent strategic capabilities. This would

argue for an approach aimed at constraining all nuclear weapons, regardless of range of the associated delivery system. That, of course, would entail greater complexity than an approach limiting just strategic offensive arms.

Dealing with unequal numbers: With the exception of the 1972 Interim Offensive Agreement, U.S.-Soviet and U.S.-Russian nuclear arms control agreements have been based on the principle of parity, that is, equality of limits in numbers of strategic delivery systems and strategic warheads. Among the UNSC Permanent Five, the easiest and perhaps only way to accommodate unequal numbers might be a bilateral U.S.-Russian treaty, setting equal limits on U.S. and Russian nuclear forces, accompanied by statements by China, the United Kingdom, and France regarding adoption of unilateral limits that presumably, at least in the case of the latter two, would be at levels well below the numbers contained in the U.S.-Russian treaty.

Achieving this outcome would require that China, the United Kingdom, and France be prepared to discuss with the United States and Russia what levels they would unilaterally cap their forces in parallel with the U.S.-Russian negotiation. The planned unilateral levels of the three would affect, and could be affected by, the limits being negotiated in the U.S.-Russian treaty. For example, were China to indicate that its planned unilateral cap was 1,500 nuclear warheads, that could lead Washington (and perhaps Moscow) to conclude that it needed a higher limit than would be the case if China set its cap at 1,000. The same might apply to British and French planned caps and their effect on what Russia concluded it would need, though nothing suggests that either country intends a force build-up comparable to China's.

The level of warheads a country decides that it needs will depend in part on its nuclear doctrine. For example, does it have a countervalue strategy, in which it aims to deter a potential aggressor by holding the aggressor's urban areas and civilian population at risk, or does it have a counterforce strategy, which requires the ability to hold a potential aggressor's nuclear forces at risk? The latter strategy would likely demand larger and more varied nuclear forces. Given the size of the U.S. and Russian nuclear arsenals, employing their weapons under even a counterforce strategy would almost certainly result in unparalleled destruction of civilian populations.

Another theoretical possibility, if all five were prepared to limit their nuclear forces, would be a multilateral negotiation aimed at producing a multilateral treaty constraining the nuclear forces of the five countries. It would be difficult to incorporate the principle of parity into such a treaty, as that would (1) allow China, the United Kingdom, and France room to increase their nuclear arsenals substantially if the limits were designed to accommodate the larger U.S. and Russian nuclear force levels, or (2) force dramatic reductions by the United States and Russia (and possibly China) to lower levels if the limits were set at numbers closer to the UK and French force levels. Achieving agreement on either approach would be problematic. Equal limits set somewhere between would likely force greater than possible reductions by the United States and Russia while leaving headroom for expansion – that would probably go unutilized – for the United Kingdom and France.

If the five were prepared to abandon the principle of parity, they might consider using the model of the 1922 Washington Naval Treaty. That agreement limited the U.S., British, Japanese, French, and Italian navies, providing among other things that the tonnage of their capital ships would be constrained to 525,000 tons (for the United States and United Kingdom), 315,000 tons (for Japan), and 175,000 tons (for France and Italy), that is, a ratio of 5-5-3-1.75-1.75.[17] In nuclear terms, that model could translate into some ratio of nuclear forces among the five with the United States and Russia at a high (but equal) level, China at a moderately high level (but well below that of the United States and Russia), and the United Kingdom and France at some lower level. However, would China, the United Kingdom, and France accept a legally-binding treaty that formalized unequal and lower limits for them, even if one more of those three states did not intend to match the levels of the United States and Russia? Most likely not.

The challenge of negotiating a multilateral treaty would, of course, become even more difficult if the negotiation was enlarged to include seven or all nine nuclear-armed states.

Non-numerical limits, risk reduction, and transparency measures: The wide differences in numbers may make it impossible, at least at the outset, for multilateral negotiations to produce treaties or agreements with numerical

limits. Other measures, however, that do not rely on the principle of parity in numbers might prove more negotiable.

For example, the parties might consider bans that would result in equal outcomes even if they imposed unequal reductions. The UNSC Permanent Five could explore a ban on nuclear-armed ground-based intermediate-range missiles. This would require China to place only conventional warheads on all its intermediate-range missiles, something that could become more feasible as the Chinese military expands the number of its ICBMs and nuclear-capable aircraft. It would also require that all five countries agree to some kind of verification regime to provide confidence that intermediate-range missiles carried only conventional warheads. This proposal would be difficult for India, Pakistan, Israel, and North Korea to adopt, given that ground-based intermediate-range missiles make up a significant part of each of their nuclear forces.

Another question worth exploring is that of dual-capable delivery systems other than intermediate-range missiles. A conventionally-armed missile launched from a dual-capable aircraft or dual-capable launcher raises the question of ambiguity; the missile could be misinterpreted by the other side to be nuclear-armed. Eliminating all dual-capable systems would hardly prove possible, but a discussion might be worthwhile on whether some delivery systems or types of delivery systems could be made exclusively conventional to reduce ambiguity that could lead to misinterpretation.

The UNSC Permanent Five could also explore risk reduction measures. The United States and Russia have a bilateral agreement on prenotification of strategic ballistic missile launches.[18] Russia and China have a bilateral agreement on prenotification of launches of ballistic missiles with a range exceeding 2,000 kilometers in certain directions (toward the other) and of all space launch vehicles.[19] Those measures reduce the prospect that a ballistic missile launch might be misinterpreted. The UNSC Permanent Five could explore a multilateral agreement requiring prenotification of all space launch vehicle launches and all strategic ballistic missile launches (or, alternatively, launches of all ballistic missiles with a range of more than 2,000 kilometers). They could also consider expanding this to the other nuclear-weapons states.

A significant number of bilateral "hotline" arrangements exist between nuclear-weapons states, including U.S.-Russia, France-Russia, UK-Russia, Russia-China, U.S.-China, India-Pakistan, North Korea-South Korea, and India-China.[20] The UNSC Permanent Five might consider whether these might be updated on the lines of the U.S.-Russian Nuclear Risk Reduction Centers and/or whether there would be utility to a multilateral hotline/confidence-building communication link among the five, for example, to convey prenotifications of ballistic missile and space launch vehicles launches in accord with a multilateral UNSC Permanent Five agreement.

The New START Treaty provided for prenotification of major strategic exercises involving heavy bombers. In parallel with a multilateral agreement on prenotification of ballistic missile and space launch vehicle launches, the UNSC Permanent Five might explore a multilateral arrangement providing for prenotification of major strategic exercises involving heavy bombers and/or mobile ICBMs. In practice, this would fall upon just the United States, Russia, and China, as the United Kingdom and France do not maintain heavy bombers or mobile ICBMs.

Other risk reduction measures include a reaffirmation by the UNSC Permanent Five of their commitment to the 1996 Comprehensive Nuclear Test Ban Treaty (CTBT) and to maintain their moratoria on nuclear explosive tests until such time as the CTBT enters into force.[****] They might in parallel seek to persuade India, Pakistan, and Israel to sign the CTBT and continue their de facto moratoria on nuclear testing. These steps

**** In September 2016, the UN Security Council adopted Resolution 2310 (http://unscr.com/en/resolutions/2310) which reaffirmed support for the CTBT and "vital importance and urgency" of achieving the entry into force of the treaty. The resolution called on all states to refrain from conducting any nuclear explosions and to continue to support and strengthen the verification regime administered by the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO). The resolution also recognizes a September 15, 2016 statement from the UNSC Permanent Five members reaffirming their legal commitment as CTBT signatories not to take any action that would "defeat the object or purpose of the treaty," which is to halt "any nuclear weapon test explosion and any other nuclear test explosion."

could help strengthen the norm against nuclear testing; no country other than North Korea has conducted a nuclear test since 1998.

The UNSC Permanent Five might also engage in a serious discussion of their nuclear doctrines and of what elements of the others' nuclear doctrines cause them concern. Such a discussion might reduce the chance of misinterpretation of another country's nuclear posture. To the extent that the five better understood the nuclear doctrines and nuclear postures of the others, it might reduce the use of worst-case assumptions that could lead to decisions to increase nuclear force deployments. China's proposal for a No First Use agreement could be explored, to include a serious discussion of how nuclear force size and posture relate to such a doctrine. India and Pakistan might be encouraged to hold a serious bilateral dialogue or be invited to join the UNSC Permanent Five discussion, given that Indian and Chinese doctrines presumably are of concern to the other.

One significant risk reduction measure that all states with nuclear weapons could do on a unilateral basis is to conduct nuclear fail-safe reviews. For the first time in 30 years, the United States is conducting such a comprehensive review of its nuclear weapons, nuclear command and control and communications, and integrated warning/attack systems to strengthen safeguards against emerging threats such as cyber/AI and unauthorized, inadvertent, or accidental use of nuclear weapons. The review, mandated by Congress, will be completed by the fall of 2024 and is expected to result in a classified and unclassified report with both technical and policy recommendations.

At a time when there is little dialogue and cooperation, and little prospect of formal near-term arms control negotiations, this would be a significant step that all states with nuclear weapons could undertake unilaterally to reduce the risk of blunder and harden nuclear systems against technical, digital, and other threats. As appropriate and with due regard to classification and other sensitivities, the United States and other countries could share key observations from their independent reviews to encourage safe policies, practices, and procedures.

The UNSC Permanent Five might also explore confidence-building and transparency measures. For example, they might agree to exchange data on their nuclear forces. The exchange could be very general: total number of nuclear warheads, number of strategic delivery systems, and number of non-strategic delivery systems. It could also entail more detailed exchanges, for example, operational status, numbers of ICBMs, SLBMs, and nuclear-capable heavy bombers, and numbers of different types of delivery systems for non-strategic nuclear weapons, and even specific locations. Other nuclear-weapon states could participate in the data exchanges as well, though persuading Israel and North Korea to join in would seem particularly difficult.

The exchanges would build confidence and might alleviate concerns about opaque nuclear forces that otherwise would lead to worst-case assumptions. They could also begin a process of building data bases that could prove useful if the involved states were later to agree to negotiate limits on and/or reductions in their nuclear weapons and associated delivery systems.

China has resisted this kind of transparency, apparently out of concern that it could compromise the survivability of its nuclear deterrent. As China continues its nuclear build-up, that concern should alleviate. Moreover, as made clear in the U.S. 2023 Strategic Posture Review, the growth in China's nuclear forces is the principal concern driving recommendations to prepare to increase the numbers of U.S. strategic offensive forces. Chinese opacity about its forces and future plans will likely lead to pressure for an expansion of U.S. nuclear forces.

The UNSC Permanent Five might go beyond data exchanges to discuss what measures might be adopted to give confidence in the exchanged data. One answer would be an agreed set of ongoing notifications about changes in nuclear forces. Inspections to verify the declared numbers likely would be a bridge too far absent a legally-binding treaty with numerical limits, but the United States and Russia might consider demonstrating how they have in the past conducted New START inspections to show that procedures can be developed that confirm numbers and declared data without compromising other sensitive information. Such an approach could be placed in the context of the NPT as facilitating disarmament by the nuclear-weapons states.

Other Issues that Might Have to be Addressed in Parallel

The U.S. preference for future bilateral negotiations with Russia has been to focus on nuclear weapons, ideally to include all U.S. and Russian nuclear weapons. Russian officials, however, have indicated a preference for a different approach. In December 2021, a senior Russian official set out a "new security equation" that would pay special attention to "nuclear and high-precision conventional systems that could be used in a counterforce strike" and missile defenses, given "the principle of the inseparable interrelationship between strategic offensive and strategic defense arms."[21]

Russia likely would raise missile defenses, an issue that has concerned Moscow since 2002, when the United States withdrew from the 1972 Anti-Ballistic Missile Treaty. Russian officials worry not only about the current number of ground-based interceptors deployed to defend the continental United States and SM-3 interceptor missiles deployed in Romania and Poland but about future U.S. missile defense plans.[22] China in the past has expressed concern about U.S. missile defense developments, including regional missile defense. Like Russia, Chinese concerns may have more to deal with future U.S. missile defense plans than current deployments. Both Russia and China might be expected to raise the issue as well in any multilateral discussion of nuclear arms and strategic stability.[23] U.S. officials have said they are prepared to discuss missile defense, but Washington has shown no enthusiasm for negotiating limits on missile defenses. If Moscow in future negotiations were to insist on missile defense limits as a *sine qua non* for further reductions in and limits on nuclear forces, U.S. officials would face a difficult choice.

Although Russian officials express concern about U.S. missile defense, the Russian military is developing missile interceptors such as the S-400 and S-500, which it maintains are comparable to the SM-3, as well as upgrading its strategic missile defense around Moscow. Those developments could concern the United Kingdom and France given their relatively small number of strategic ballistic missile warheads.

Russian and Chinese officials have expressed concerns about U.S. long-range, precision-guided conventional strike systems, which they have said could pose a threat to their strategic systems.[24] The United States deploys a significant number of conventionally-armed sea- and air-launched missiles, which constitute a key part of its power projection capabilities, and has shown little enthusiasm for discussing limits on such systems in the past. Both the Russian and Chinese militaries are developing and deploying long-range strike systems of their own, a number of which are dual-capable. The impact of conventional and dual-capable strike systems on overall strategic stability likely would arise in any multilateral discussion of limits on nuclear arms. A new area of concern is hypersonic weapons systems armed with conventional warheads, which the United States, Russia, and China are all developing (and Russia has begun deploying). Revived U.S.-Russian discussions or perhaps discussions involving China might address limits on hypersonic weapons or how to address potential activities involving such weapons that could raise concerns among other parties about possible preparations for an attack.

Another set of issues involves the space domain. Russia and China have proposed a draft agreement to ban weapons in space, which elicited little positive reaction from the U.S. officials, who noted that the draft would not constrain ground-based anti-satellite systems, among other deficiencies. However, the United States has adopted a policy of not conducting anti-satellite tests that generate orbital debris, and its dependence on satellite systems gives it an incentive for some discussion of how to limit threats to satellites in orbit. This would mainly be a trilateral discussion among the United States, China, and Russia, but it could be of interest to other nuclear-weapons states.

Finally, the UNSC Permanent Five, perhaps joined by other nuclear-weapons states, might discuss the implications of developments in the cyber domain and artificial intelligence for nuclear forces and strategic stability. Formal negotiated limits in this area appear infeasible, but topics for discussion could include the threats posed by cyber warfare and Artificial Intelligence (AI) to command and control of nuclear forces, unilateral steps to minimize such threats, possible confidence-building measures that might alleviate some concerns regarding offensive uses of cyber warfare and AI, and discussions of permitted and prohibited activities. However, given the nature of cyber operations and AI, it likely would not be possible to go much beyond declarations of principle (for example, "a person must be in the command loop for all nuclear force operations"), though a more ambitious effort might seek to elaborate norms, rules

of the road, and best practices to mitigate risks posed by these technologies to nuclear safety and security and strategic stability.

Recommendations for Near-Term Action

Current geopolitical circumstances make it difficult to envisage an early resumption of stability or nuclear risk reduction discussions, to say nothing of formal negotiations between the United States and Russia or with other nuclear-weapon states. Arms control can contribute to global stability and security by averting greater nuclear risk, increased military expenditures, and the possibility of further nuclear proliferation. It could also stop the current nascent nuclear arms race. The below recommendations focus on near-term actions that the United States, Russia, China, and other nuclear-weapon states could take, with a view to preparing the ground for more formal negotiations at the appropriate time on controlling and reducing nuclear arms.

- The United States and Russia should restore New START to full functioning, including by resuming data exchanges, notifications, and on-site inspections as provided for by the treaty.

- Russia and the United States should resume their dialogue on nuclear arms and related issues such as missile defense and long-range precision-guided conventional strike weapons, with a view to negotiation of a follow-on treaty to New START that would cover their strategic nuclear forces and possibly other U.S. and Russian nuclear weapons.

- Until the United States and Russia have negotiated a follow-on treaty to New START, they should agree to continue to observe New START's numerical limits and perhaps some data exchanges and notifications even after the treaty expires in February 2026, at least for an initial period of time.

- The United States and China should begin a bilateral dialogue on strategic issues and averting potential U.S.-China nuclear arms race. In addition to nuclear weapons issues, this dialogue should address related questions such as nuclear doctrine, missile defense, and long-range precision-guided conventional strike weapons.

- The United States and Russia should explore possible agreements covering their intermediate-range missiles. Possible options include a global limit or ban, a limit or ban on the deployment of intermediate-range missiles in Europe, and/or an agreement that all intermediate-range missile systems will be conventionally armed only.

- The UNSC Permanent Five reporting and transparency process, which offers the only current working forum for addressing nuclear weapons issues, should adopt a more ambitious approach and intensify their dialogue on nuclear arms-related issues, including:

  - "Early strategic dialogue": Discuss the model of a "nuclear balance of power" which has a multilateral character, as well as related risks and threat perceptions, with a view toward elaborating a common understanding of the nuclear order and a framework for addressing the UNSC Permanent Five's basic concerns through arms control and confidence- and security-building measures.
  - Such a model could include "strategic stability" (with a broader definition of "predictable and manageable relations of adversaries") in a way that takes account of the more complex nature of interrelationships among the UNSC Permanent Five members.
  - Discuss establishment of a uniform reporting format or data base of key information on their nuclear weapons inventories (number, status of nuclear warheads and delivery systems). (Such an improvement in reporting within the NPT could be a role model for other NWSs.)
  - Discuss how such a format could be expanded to apply to all nuclear-weapon states, which would likely require reporting information on all types of nuclear weapons, not just strategic nuclear forces.
  - Begin discussion of possible formats for negotiating nuclear reductions and of models for agreements on reductions and limitations.
  - Discuss possible risk reduction measures, such as a multilateral agreement on pre-notification of launches of ICBMs, SLBMs, and space launch vehicles or a multilateral crisis communications network.

- Consider elevating the level of participation in the UNSC Permanent Five forum to under-secretary of state equivalent.

- Discuss the concept of unilateral nuclear fail-safe reviews and, as appropriate, sharing information about the reviews being conducted or planned, and sharing of best practices, with a view to all nuclear-weapon states conducting such unilateral reviews. The goal is to ensure the safety and security of nuclear weapons and related systems and to minimize the risk of nuclear use by blunder or other unauthorized action.

  - Ideally, all nuclear-weapons states would conduct this, but it could be a subject first for the UNSC Permanent Five dialogue. A dialogue between India and Pakistan, either bilateral or along with the UNSC Permanent Five, would make particular sense.
  - As a first step, United States could consider briefing its review, the methodology used, and some of the results, either in the UNSC Permanent Five format or with a broader group of nuclear-weapon states, encouraging others to conduct their own reviews as they see fit. This could lay an important foundation of dialogue on which to build in the future.

- Energize discussions within the International Partnership for Nuclear Disarmament Verification, with a view to developing and having ready multilateral approaches and technical solutions for warhead identification and inspections that could be drawn upon for verification of future agreement on the reductions in and limitations on nuclear weapons systems, including for verifying the irreversible elimination of retired nuclear warheads.

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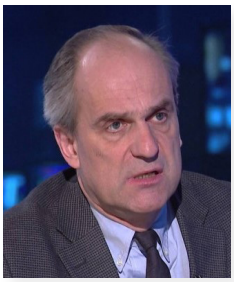

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About Deep Cuts

For years, more and more arms control treaties have been eroding and nuclear disarmament is in a deep crisis. The goal of this research and transfer project is to analyze obstacles to U.S.-Russian nuclear and conventional disarmament, to strengthen European security and to develop concrete risk-reduction measures that limit the potential for military escalation in the short term and aim to cut nuclear stockpiles in the long term. The Deep Cuts Commission was established in 2013 and is coordinated by IFSH. The project partner is the independent Arms Control Association in Washington, D.C.

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Impress

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