



THE SIZE AND CHARACTERISTICS OF THE RUSSIAN NUCLEAR STOCKPILE

The remarks below were delivered at a symposium on “The Size and Characteristics of the Russian Nuclear Stockpile” hosted by the National Institute for Public Policy on September 27, 2023. The symposium keyed off an Occasional Paper by National Institute’s Senior Analyst Mark Schneider that examined widely published Western estimates of Russia’s nuclear arsenal and whether those estimates reflect an accurate picture of Russia’s nuclear capabilities.

David J. Trachtenberg

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As I noted in the invitation to this webinar, this discussion will highlight a recent National Institute *Occasional Paper* by Mark Schneider, which argues that the size and composition of Russia’s nuclear weapons arsenal—both strategic and non-strategic forces—may be significantly larger and more capable than is generally assumed. Further, the unclassified estimates often cited in the Western press regarding Russia’s nuclear stockpile—estimates that are generally accepted uncritically—may substantially undercount Russia’s actual arsenal and, in doing so, may have the effect of diminishing or eroding support in the United States for the required nuclear modernization efforts necessary to strengthen deterrence.

This latter point, I believe, is especially important, as underestimating the size and characteristics of Russia’s nuclear force may lead U.S. policymakers to make decisions about U.S. nuclear strategy, nuclear force programs, or arms control proposals, that are not necessarily in the best security interests of the country and may risk undermining the effective functioning of deterrence. In today’s highly volatile international security environment, this could have dangerous consequences.

Indeed, for more than three years there have been no on-site inspections as required under the New START Treaty; therefore, it is not possible to say with any degree of certainty that Russia is in compliance with the treaty’s numerical ceilings. If Russian force loadings exceed the number of “accountable” systems under the treaty, then that carries significant implications for deterrence, especially if Russia believes it enjoys an exploitable advantage that encourages provocation. The implications of this for NATO and the assurance of allies, and for the credibility of the U.S. extended deterrent, are also significant.

As Mark’s comprehensive report demonstrates, the estimates of Russian nuclear forces often cited by Western sources are highly questionable at best, often lacking credible sourcing and making certain assumptions regarding force loadings that may not reflect reality. In fact, the report contends that Russia probably has substantial advantages in both strategic and non-strategic or tactical nuclear forces and that the most commonly cited unclassified Western estimates of Russia’s nuclear forces likely underestimate Russia’s nuclear capabilities by a significant margin and may lead to a false sense of security.



The report is meticulously detailed, citing numerous Russian sources and experts who openly state that Russia's nuclear forces may be substantially greater than Western estimates suggest. It concludes that "a sober public understanding of the threat is necessary" to ensure the United States can adequately develop and deploy the capabilities necessary to deter and defend against adversaries.¹

The study also concludes with a stark warning. It states: "It is unclear if the United States can successfully deter Russian nuclear escalation under plausible circumstances if Russia has such a large quantitative and qualitative advantage in nuclear weapons."² An imbalance in nuclear capabilities is important, the study notes, "because it almost certainly shapes Russian decision-making regarding nuclear employment."³ And it states that "Putin's decision to introduce the use of nuclear weapons potentially could turn on his perception of the scope of Russia's nuclear advantage and options, which involve very large asymmetries in numbers, modernization and force diversity."⁴

Given the possibility of Russian nuclear escalation in connection with Moscow's ongoing war against Ukraine, this is a sobering conclusion.

The study is posted on our website. At more than 230 pages, it is the most comprehensive treatment of this important issue that I have seen and, I would argue, is critically important now, when the issue of nuclear weapons and the potential for nuclear use is of growing concern, and when the requirements for effective deterrence are more complicated in a world of not one, but two nuclear peer competitors.

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Mark B. Schneider

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In light of Russia's vicious war against Ukraine, its constant nuclear threats, and the Biden Administration's announcement that it will *not* maintain nuclear parity with Russia and China, an accurate assessment of the balance of nuclear weapons is critical.

Nuclear warhead numbers are important because they shape: 1) what type of nuclear strategy and target coverage is possible, 2) the damage expectancy that can be achieved, and 3) the ability to penetrate or saturate defenses.

Since the 1990s, the USG has said little to the public about the scope and details of Russian nuclear capability and very little information was released under the New START Treaty. The last official USG estimate of the total number of Russian nuclear weapons (4,000-6,500) dates from 2012. Public statements involve only ominous one-liners. For example:

¹ Mark B. Schneider, *How Many Nuclear Weapons Does Russia Have? The Size and Characteristics of the Russian Nuclear Stockpile, Occasional Paper*, Vol, 3, No. 8 (Fairfax, VA: National Institute Press, August 2023), p. 232.

² *Ibid.*, p. 231.

³ *Ibid.*, p.232.

⁴ *Ibid.*

- “Russia maintains the largest and most capable nuclear weapons stockpile, and it continues to expand and modernize its nuclear weapons capabilities.” – Director of National Intelligence Avril Haines, February 2023.
- “Russia is also modernizing and expanding its nuclear arsenal.” – Secretary of Defense. Lloyd Austin in December 2022.

This was echoed by NATO Secretary General Jens Stoltenberg who, in June 2023, stated, “...Russia has modernised [its] nuclear weapons, deployed more nuclear weapons...”

An internet search for the number of Russian nuclear weapons will reveal, courtesy of the Federation of American Scientists (FAS), that Russia has approximately 5,977 nuclear weapons. Suggesting this level of accuracy is misleading, since Russia may have about six thousand weapons but it is also possible that it may have about double that number, and the Russian force is increasing.

The FAS supports what it calls “minimal deterrence” and opposes most U.S. nuclear modernization and the Triad; hence, it has an incentive to minimize public awareness of the scope and capability of Russian nuclear forces.

The annual FAS report on Russian nuclear weapons is obviously the product of much research. However, its numbers that much of the media treats as fact are largely undocumented, and I do not believe for most of them that such documentation exists.

The FAS “Russian nuclear forces” chart, which is frequently cited, appears to be a combination of the authors estimates of: 1) the maximum upload capability of Russian strategic offensive forces, 2) either the total inventory or the number of “assigned” Russian non-strategic (or tactical) nuclear warheads, and 3) the number of Russian nuclear weapons awaiting dismantlement. This does not match the categories in U.S. announced nuclear weapons data – active, inactive and awaiting dismantlement.

It is clear that the FAS strategic force numbers are much less than Russia’s maximum potential and assume, with little justification, New START Treaty compliance.

The FAS warhead numbers for Russian ICBMs and SLBMs are mainly 15-30 year old START Treaty accountability numbers which do not always represent the maximum potential of the Soviet-era systems and mainly do not apply to post-Cold War systems. All of the post-Soviet Russian ICBMs and SLBMs can reportedly carry several times as many warheads than can possibly be deployed under New START – 6-10 for the SS-27 Mod 2/RS-24 Yars ICBM and the Bulava-30 SLBM. Ten warheads would require a new lighter and smaller reentry vehicle (RV). The Russian Layner/Liner reportedly can carry up to 12 nuclear warheads of existing types.

Russia has just announced it has deployed the new Sarmat heavy ICBM, probably prematurely. The FAS credits it with ten 500-kiloton warheads, about the same as it did with the Cold War-era Soviet SS-24 (not the RS-24/Yars) ICBM with about 40 percent of its throw-weight. According to *RT* (Russian state media), the Russian Ministry of Defense (MOD) said the “...Sarmat will be able to carry up to 20 warheads of small, medium and high power classes.” This apparently means 100-150-kt, 300-350-kt and 800-kt, respectively. The

reports of a 10-15 warhead capability refer to a much smaller version of the missile (100 vs. 200 tons) that was never built.

The FAS conclusion that Russia has only 200 deployed heavy bomber weapons is only about one-fourth of almost all estimates of Russian capability.

Because of the end of New START Treaty on-site inspections since March 2020, it is possible that Russian ICBMs and SLBMs have been covertly uploaded. In December 2019, former Under Secretary of State Rose Gottemoeller warned that Russian upload capability was up to 1,000 warheads. I believe this number is quite low.

The desired Russian strategic nuclear warhead level may not be to the maximum possible warhead loadings, but it may be much higher than a New START Treaty-limited force. There was significant evidence of Russian cheating even before the end of New START Treaty-mandated on-site inspections. This involves both mobile ICBMs and long-range nuclear-capable air-launched cruise missiles on fighter aircraft and Backfire bombers. If these reports are true, Russian strategic nuclear forces are larger than the current high estimates.

In December 2017, Bill Gertz reported, "Russia is aggressively building up its nuclear forces and is expected to deploy a total force of 8,000 warheads by 2026.... The 8,000 warheads will include both large strategic warheads and thousands of new low-yield and very low-yield warheads to...support Moscow's new doctrine of using nuclear arms early in any conflict."⁵ In August 2019, then-Deputy Assistant Secretary of Defense for Nuclear Matters Rear Admiral (ret.) Peter Fanta stated that, "The Russians are going to 8,000 plus warheads."⁶

In September 2019, James R. Howe wrote that planned Russian strategic nuclear forces could carry between "2,976 WHs [warheads], and a maximum of 6,670 WHs" plus over 800 bomber weapons.⁷ His estimates are the best that are available in open sources. He will present some updated numbers today.

In 2019, then-DIA Director Lt. General Robert P. Ashley observed that, "Russia has improved and expanded its production complex, which has the capacity to process thousands of warheads annually,"⁸ which could almost support Cold War warhead levels.

Sergei Rogov has recently said Russia has about 6,000 strategic nuclear warheads. In 2018, Strategic Missile Troops (RVSN) commander Colonel General Karakayev suggested Russia had over 3,300 deployed strategic nuclear warheads.

⁵ Bill Gertz, "Russia Sharply Expanding Nuclear Arsenal, Upgrading Underground Facilities," *Washington Free Beacon*, December 13, 2017, available at <http://freebeacon.com/national-security/russia-sharply-expanding-nuclear-arsenal-upgrading-underground-facilities/>.

⁶ Peter Fanta, Deputy Assistant Secretary of Defense for Nuclear Matters, speaking at the NWSC Crane Triad Symposium, August 23, 2019.

⁷ James R. Howe, "Future Russian Strategic Nuclear and Non-Nuclear Forces: 2022," in Stephen J. Blank ed., *The Russian Military in Contemporary Perspective* (Carlisle, PA: U.S. Army War College, Strategic Studies Institute, September 2019), p. 358, available at <https://press.armywarcollege.edu/monographs/907/>.

⁸ Robert P. Ashley Jr., "Russian and Chinese Nuclear Modernization Trends," Defense Intelligence Agency, May 29, 2019, available at <https://www.dia.mil/Articles/Speeches-andTestimonies/Article/1859890/russian-and-chinese-nuclearmodernization-trends/>.

Russia has a very diverse force of non-strategic or tactical nuclear weapons at least ten times greater than those of the United States and is now deploying nuclear-capable hypersonic missiles. The typically reported Russian number is 2,000, which the *2022 Nuclear Posture Review* (NPR) states counts only active warheads, a figure that can be much smaller than the total inventory.

Since 2005, Russia has consistently claimed a 75 percent reduction in its tactical nuclear weapons from late Soviet levels, which equates to 5,000 or more retained weapons. In 2014, *Pravda.ru* reported 5,000 tactical nuclear weapons, which it says was a “conservative” estimate. Dr. Philip Karber, President of the Potomac Foundation, has stated that roughly half of Russia’s 5,000 tactical nuclear weapons have been modernized with new sub-kiloton nuclear warheads for air defense, torpedoes and cruise missiles. In 2023, Dr. Karber wrote that Russia had 2,050 modern non-strategic nuclear warheads, including enhanced radiation warheads and weapons with yields as low as 20 tons of TNT.

In September 2022, *Politico* quoted a Biden Administration official as saying the Russians “...have warheads we call micro-nukes, with tens to hundreds of tons of explosive yield.”⁹ Noted Russian journalist Pavel Felgenhauer reported Russia was developing them over 20 years ago.

In 2020, Ambassador Marshall Billingslea and, in 2021, then-Vice Chairman of the Joint Chiefs of Staff General John Hyten both stated that Russia had thousands of low-yield nuclear weapons.

Russian sources have reported much higher numbers for its non-strategic nuclear weapons. For example, in April 2011, Colonel General (ret.) Viktor Yesin, a very well-connected former Chief of Staff of the Strategic Missile Forces, stated that estimates of the Russian tactical nuclear stockpile ranged from “tens of thousands to 4,000 - 4,500.”¹⁰ At the time, the United States’ unclassified estimate was 2,000-4,000. Noted Russian journalist Pavel Felgenhauer has written that assessments of Russian non-strategic nuclear weapons range between several thousand and more than 10,000. He also said that the total Russian nuclear inventory may “...have more (maybe twice as many overall) than all the other official or unofficial nuclear powers taken together.”¹¹

The higher estimates are important because, if correct, they could signal a shift toward substituting precision low-yield/low-collateral damage nuclear strikes for precision conventional strikes, which have not worked well for them in the Ukraine war.

In the 2022 NPR, the Biden Administration took action to reduce the U.S. nuclear deterrent and presented arms control as “the most effective, durable and responsible path

⁹ Bryan Bender, “U.S. Steps Up Intel, Surveillance after Putin’s Nuke Threats,” *Politico*, September 22, 2022, available at <https://www.politico.com/news/2022/09/27/putin-nuke-russiaukraine-intel-surveillance-00059020>.

¹⁰ “Moscow, Washington Must Demonstrate Openness Regarding Nuclear Potentials – Expert,” *Interfax*, April 18, 2011, available at <https://wnc-eastview-com.mutex.gmu.edu/wnc/article?id=31236848>.

¹¹ Pavel Felgenhauer, “Putin Delivers More Restrained National Address as Moscow Announces Partial Troop Withdrawal,” *Eurasia Daily Monitor*, Vol. 18, Iss. 65 (April 22, 2021), available at <https://jamestown.org/program/putin-delivers-more-restrained-national-address-as-moscow-announces-partial-troop-withdrawal/>.

to reduce the role of nuclear weapons in our strategy and prevent their use.”¹² This is unrealistic because Russia has no intent to agree to a verifiable agreement that reduces nuclear weapons and has a terrible record of noncompliance with arms control obligations.

Arms control virtually guarantees undercounting Russian nuclear weapons because compliance issues are decided by the National Security Council (NSC), which makes them fundamentally different from routine intelligence and threat assessments and it appears to impact the information about Russian nuclear weapons numbers that is made public.

The low and largely undocumented FAS estimates of Russian nuclear capabilities appear to be aimed at justifying its arms control agenda. Misleading low numbers concerning Russian nuclear capability can reduce public and congressional support to sustain a credible U.S. nuclear Triad, which badly needs modernization against the unprecedented nuclear threats that the United States and its allies face today.

It is unclear if the United States can successfully deter Russian nuclear escalation *under all plausible circumstances* if Russia has a large quantitative and qualitative advantage in nuclear weapons, and the threat to U.S. national security will get worse with the rapid Chinese nuclear buildup.

James Howe
President of Strategic Concepts and Analysis

Russia’s objective is to achieve nuclear escalation dominance and ultimate victory. This objective guides Russian theater and strategic nuclear force development.

Following is an example of the type of nuclear escalation ladder Russia likely follows to guide theater and strategic nuclear force development, starting at the top and working down to the bottom rung of the escalation ladder. Self-interest dictates keeping force applied consistent with conflict objectives and minimizing collateral damage—but those considerations are ignored when Russia reaches the top rung of the escalation ladder.

1. Step 1 is integrated cyber/electromagnetic warfare and influence operations—these are integrated at all levels and used in peace and war, with the magnitude of use scenario dependent. All elements of national power are also applied as needed all along the escalation ladder.
2. Step 2 is to expand conventional global strike capability—air, ship, and submarines with long-range cruise missiles. Conventional ICBMs remain aspirational. The Russian long-range cruise missile (LRCM) performance in Ukraine shows severe reliability/survivability issues with up to 80-90 percent being intercepted. This raises questions about the true capability of Russia to develop a credible global conventional

¹² U.S. Department of Defense, *2022 Nuclear Posture Review* (Washington, D.C.: Department of Defense, October 2022), p. 16, available at <https://media.defense.gov/2022/Oct/27/2003103845/-1/-1/1/2022-NATIONAL-DEFENSE-STRATEGY-NPR-MDR.PDF>.

strike capability and capacity that could pose a credible threat to the United States or other nations' major interests, much less vital or survival interests.

3. Step 3 is to develop policy (e.g., strategic operation for the destruction of critically important targets (SODCIT)) and capability for future theater and strategic nuclear warfare employing limited destruction but extensive nuclear attacks with accurate (<5 meters), low yield (<1 kt), clean (<10 percent fission) and tailored effects nuclear weapons (Neutron, EMP, X-Ray). Russia will continue to rely on theater and strategic nuclear weapons to deter, threaten, coerce, and employ in warfare to achieve national interests.
4. Step 4 is the modernization and expansion of current strategic nuclear forces to dominate any adversary. This will enable a major nuclear attack on adversary nuclear forces, bases, administrative/political centers, and war production capacity with the objective of victory. Within this step there are a number of execution options to keep force applied consistent with conflict objectives.
5. Step 5 is the threat or actual employment of terror weapons for intra-war deterrence, coercion, and if necessary, destruction of the adversary nation--militarily, politically, and economically, These terror weapons include:
 - a. Nuclear powered torpedoes with 100 MT warheads to destroy coastal cities, ports, and naval bases;
 - b. ICBMs with 50 MT warheads to precipitate geophysical damage, i.e., earthquakes and volcanic eruptions;
 - c. Unrestricted cyber-attacks to disrupt and physically destroy critical infrastructure;
 - d. Unrestricted use of super EMP attacks to destroy electronics (e.g., power grid) for the entire continental United States; and
 - e. Nuclear powered cruise missiles for nuclear or repeated high-power microwave (HPM) attacks.

Despite Russia's rhetoric concerning their goal to remain the dominant nuclear superpower, there are significant uncertainties as to Russia's future strategic nuclear forces (SNF). Some considerations are:

- a. The numbers, types, and capabilities of future Russian SNF required for new missions enabled by advanced technologies, such as improved accuracy and tailored effects;
- b. Improved missile accuracy, which enables use of low-yield warheads, and in turn enables a missile to carry more warheads;
- c. Russia has conducted extensive warhead tests. Open sources suggest some of these involved exo/endo-maneuvering RVs in order to defeat missile defenses. Might others have been maneuverable reentry vehicles (MaRVs) or terminal sensors to enable low-yield weapons?

- d. Russia has been conducting extensive hydro-nuclear tests, which enable new/improved warhead development;
- e. There are also significant uncertainties with regard to ICBM/SLBM production: For example, Votinsk has been upgraded and modernized and can produce up to 40 Yars ICBMs and Bulava SLBMs per year; Krasnoyarsk, which produces liquid SLBMs, also has been upgraded and modernized and will be producing the liquid engine Sarmat (>10/year?) and reportedly a new liquid SLBM. Khrunichev produced the SS-19 and currently produces the Angara space launch vehicle. For comparison, the Soviet Union at its peak produced about 200 ICBMs and SLBMs each year.
- f. Russia is in decline and combination of sanctions, and limitations on technology, resources and financing will limit ICBM, SLBM, and bomber development and production even though SNF production and deployment is the top priority—many programs (e.g., Sarmat, PAK-DA, S-500, Borei/Bulava, Rubezh IRBM and the Barguzin rail mobile ICBM) have been delayed and Russia has very significant Ukraine war production issues, as major weapon systems are being destroyed faster than they can be produced.
- g. Russia's SNF will be integrated with defense forces (active & passive), which will have a significant impact on the future strategic nuclear force structure as active defenses are deployed. The S-500 is capable of defending against threat ICBMs and SLBMs and Russia plans on deploying a nation-wide ABM defense based on the S-500. Ten S-500 battalions currently are to be deployed (~320 interceptors?). An integrated offense/defense force will provide a more effective deterrent and coercive power, as well as a more effective warfighting force, significantly impacting an adversary's policy, strategy, force requirements and application calculus.

Russia's history of secrecy, deception and treaty violations further limits U.S. visibility into Russia's intentions, capabilities, and capacities, in spite of the U.S. intelligence community's massive and highly capable technical collection capabilities.

According to the Federation of American Scientists (FAS), "All warhead numbers come with considerable uncertainty because of limited transparency of Russian nuclear capable forces."¹³ Yet, the FAS consistently undercounts. Why?

One assumption may be that Russia will abide by the New Start Treaty limits, so FAS considers that Russia will download or retire systems as needed to stay within treaty limits. Given Russia's current SNF upload capability, it is obvious that Russia has produced significantly more strategic nuclear delivery vehicles than required to stay within New Start treaty limits. If Russia truly wanted to honor the treaty limits, they would produce new weapons at a rate to replace weapons being retired—instead, they have been producing

¹³ Hans Kristensen, Matt Korda, and Eliana Johns, "Nuclear Notebook: Russian Nuclear Weapons, 2023," Federation of American Scientists, May 8, 2023, available at <https://fas.org/publication/nuclear-notebook-russian-nuclear-weapons-2023/>.

ICBMs (e.g., Yars/Sarmat) with significantly greater warhead capacity than the ICBMs being replaced (e.g., Topol/SS-18). If Russia keeps to the announced schedule of PAK-DA bomber and Arcturus SSBN production, there could also be a larger bomber and SSBN force than forecast; however, considering Russia's ailing economy, sanctions, technology limitations, workforce, and other issues, this is unlikely, even for top priority programs.

What follows below is a 2043 forecast of Russian SNF delivery vehicles and warheads. ICBM/SLBM warhead numbers are based on the maximum number tested, although this is an area which could rapidly change based on SNF mission and warhead capabilities.

Russian ICBMs: The current Russian ICBM force structure was used as a 2043 forecast upper limit, although Russian industry certainly could produce more, depending on financing and resources available.

Russia's SS-18 ICBM is being replaced by the Sarmat ICBM and is expected to be replaced on a one-for-one basis in upgraded (possibly super-hardened and defended) silos, although timing is critical. The SS-18 is far past retirement age and the Sarmat was reported as being on combat duty in 2023, yet testing and full rate production continues to be delayed. Nevertheless, the conversion should be completed by 2028-30, depending on the Sarmat production ramp-up rate and the actual rate of Sarmat production (which is unlikely to exceed 10/year for a deployed force of 46-55 and another 20-30+ for operational test and evaluation launches). Russia has an unknown number of additional SS-18 silo's available and additional silo's (possibly super-hardened) can be constructed. The Sarmat will carry 15-20 warheads (depending on yield) but could carry up to 50 warheads that weigh 100 kg. A force of 46 Sarmats with 20 warheads each could carry a total of 920 warheads. The FAS estimates only 10 warheads per Sarmat, even though the Sarmat has a significantly greater range and payload capability than the SS-18.

The SS-19 (of which some 43 may currently be deployed) carries 6 warheads each (for a total of 258 warheads) and is currently programmed to carry the Avangard (1 Avangard/SS-19 M4). Seven of 12 Avangards have already been deployed. However, the FAS shows no SS-19 deployed and the SS-19 is expected to be retired by 2030. The Avangard will transition to the Sarmat as the Sarmat is deployed. The Sarmat reportedly can carry 5 Avangard warheads, so the total number of Avangards to be deployed is still unknown. The primary Avangard mission is defeat of missile defenses using speed (Mach 15-27) and maneuvering, and to penetrate missile defenses to destroy high-value, time-urgent targets with a 2 MT warhead and accuracy that is significantly better than ballistic warheads.

The SS-25 Sickle ICBM likely will be retired by 2025, and the SS-27 Mod 1 Topol will be retired in the 2030s and replaced by the Yars. There currently are 18 mobile and 60 silo-based SS-27 Mod 1s, each with 1 warhead, although they could carry up to a maximum of 7 warheads, for a total of anywhere from 78 warheads to 546 warheads.

The RS-24/SS-27 Mod 2 Yars ICBM carries 4 warheads and has the throw-weight to carry 7 smaller warheads. There are reports of 10 warheads, although it has never been tested with more than 6. There are currently 22 silo-based and 135 mobile Yars, for a total of 132 silo-based and 810 mobile warheads (a total of 942 warheads), with the number of deployed Yars growing as Topols are retired. The 2043 forecast is 36 silo-based and 108 mobile Yars

as the new Kedr ICBM begins to replace the Yars around 2030. Although the bulk of the Yars will only be about 15 years old by 2030, they could be kept on duty, with Kedr production adding to the force. It is unknown if additional Yars have been produced for operational test and evaluation, or if operational missiles will be used and replaced by the Kedr. There are also 36 RS-24 "S" versions, each with 3 larger warheads, for a total of 108 warheads. It is believed this is the number that will be deployed. There is also the Yars RS-24 "M", with 2 Independently Propelled Ballistic Vehicles (IPBV) to counter missile defenses. None are currently deployed, although it is assumed 27 could be deployed by 2043 for a total of 54 warheads.

According to the FAS, the total number of ICBM warheads deployed on 321 ICBMs in 2023 is 1197. However, they could actually be upgraded to 2,337 warheads. By 2043, the number of warheads could reach anywhere from 2,726 to 3,246 on 383 ICBMs, depending on upload assumptions. The number of ICBM warheads could further increase if larger numbers of smaller, lower yield warheads were deployed, and/or the number of ICBMs deployed increased (e.g., Kedr produced and Yars not retired, or more than 46-55 Sarmat are deployed).

Russian SSBN/SLBMs: Russia has stated a requirement for 14 SSBNs, and this assessment was considered the upper limit, although if 12-14 Borei SSBNs are produced and the Arcturus is produced starting around 2030, then Russia could have more than 14 SSBNs.

The five Delta IV SSBN are each equipped with 16 SS-N-23 SLBMs, and each have the Layner front-end, which could carry 8-12 warheads according to Makeyev, the designer (the FAS assumes only 4) for a total of 640-960 warheads. The Delta IVs were built at a rate of 1 per year from 1984-1990 and are expected to remain in service until approximately 2030, as they have been modernized and equipped with the new Layner front-end for the upgraded SS-N-23. They will then transition out by 2035 as the new Arcturus SSBN is expected to enter service in the 2030 timeframe armed with 12 new liquid fueled SLBMs, and each SLBM is also expected to carry 8-12 warheads.

There are currently six Borei SSBNs, each with 16 Bulava SLBMs and each carrying 6 warheads (the most the Bulava has been tested with) resulting in a total of 576 warheads. Four more Borei SSBNs are under construction and another 2-4 are planned, for a total of 12-14 Borei SSBNs. The 2043 forecast is for 14 Borei SSBNs, each with 16 Bulava SLBMs, and each SLBM carrying 6 warheads for a total of 1,344 warheads. The FAS estimates 896 SLBM warheads, but the current force can be upgraded to between 1,216 and 1,536 warheads, which is 320 to 640 warheads more than the FAS estimates.

The Arcturus SSBN is reported to be in research and development and should be laid down in approximately 2024 for a 2030 initial operating capability, although with the Borei still under construction it may be delayed. The Arcturus reportedly will only carry 12 new liquid fueled SLBMs with greater performance than the Bulava or Layner. It is assumed that it will also carry 8-12 warheads. Three Arcturus SSBNs are forecast by 2043, for a total of 216-360 warheads. In addition to replacing the Delta SSBNs, the Arcturus will also start replacing the Borei, as the oldest will be 30 years old in 2042. However, Russia may decide

to maintain a larger SSBN force and keep the Borei for 40 years, as they appear to be planning for the Delta IVs. The total SLBM warhead numbers for 2043 would be 1,370-1,704.

There are currently two Poseidon torpedo launchers, one a modified Oscar II SSGN and the other based on a modified Borei SSBN hull. Each carries six Poseidon torpedoes, which are nuclear powered and carry a 100 MT warhead. As they are nuclear powered, they have near unlimited range and endurance. Two to four more Poseidon launchers are reportedly planned, based on the Borei SSBN hull—as yet none have been laid down, another indication of finance and resource problems in Russia. If they are laid down, there would be 24-36 Poseidon torpedoes in the force structure by 2043.

While not considered strategic, the homeland attack potential of the Yasen SSGN with Tirsikon hypersonic missiles needs to be closely monitored. The Tirsikon can travel 1,000 km in less than 5 minutes—4 Yasen are currently deployed and 12 are planned, each capable of carrying up to 32 missiles, for a total of 384 warheads. There are open-source reports that U.S. anti-submarine warfare forces cannot maintain track of the Yasen SSGN,¹⁴ creating the potential for surprise attack against the U.S. National Command Authority and command, control, and communication (C3) nodes in support of a Russian strategic nuclear attack. While time-of-flight may be 5 minutes or less, U.S. defenses may not detect and provide warning of the hypersonic missile prior to impact.

Russian Bomber Force: It is forecast that there will not be a large increase in the bomber force, the biggest change being the replacement of the Bears by new production Blackjack bombers and continued delay of the PAK-DA stealth bomber in the forecast period. Russia currently has a force of 27 TU-95-H6 Bear bombers, which can carry 6 long-range air-launched cruise missiles (ALCMs), for a total of 162 warheads; 28 TU-95-H16 Bear bombers, which carry 16 long-range ALCMs, for a total of 448 warheads; and 16 TU-160 Blackjack bombers, which can carry 12 long-range ALCMs for a total of 192 warheads. The Bears are all being modernized, and each will carry 16 long-range ALCMs and will stay in service until about 2040. The 16 original Blackjacks are being modernized to the same specifications as the 50 new Blackjacks that have been ordered, and at 12 ALCMs each, the force will carry 600 long-range ALCMs, providing a bomber force which could deliver a total of 792 warheads in an initial strike—and of course, bombers can be reloaded, if the weapons are available. The FAS estimates the bomber force can carry 580 weapons, when they can actually be uploaded with 766 ALCMs. There are 10 Blackjacks currently under contract with 50 planned and will be produced at a rate of approximately 3 per year, requiring about 17 years for completion, in the 2040 timeframe. By comparison, the United States built 100 B-1 bombers in 5 years, roughly 20 per year. The 2043 forecast is 792 ALCMs, taking into account the production of 50 new Blackjack bombers and the retirement of 55 Bear bombers. Under New Start Treaty counting rules, bombers count as one weapon, irrespective of how many weapons they can carry.

¹⁴ Caleb Larson, "Russia's Yasen-Class Submarines: Why Can't the U.S. Navy Track It?," *The National Interest*, March 24, 2021, available at <https://nationalinterest.org/blog/reboot/russia%E2%80%99s-yasen-class-submarines-why-cant-us-navy-track-it-180936>.

Russia's stealth bomber, the sub-sonic PAK-DA is to be developed along with the Blackjack; however the PAK-DA continues to be delayed and given Russia's finance and technology problems it may never be built in the mid-term, leaving Russia to instead rely on the 50 or so new production Blackjack bombers. The continued delay of the Su-57 stealth fighter and reports of its relatively poor stealth capabilities may be indicative of the problems Russia faces in building a stealth bomber.

In addition to the bomber force, Russia is developing a nuclear-powered cruise missile, the 9M730 Burevestnik (the NATO-designated SSC-X-9 Skyfall), reportedly armed with a 2 MT warhead, or even up to 10 smaller warheads. Another possibility is a High-Power Microwave (HPM) warhead powered by the nuclear reactor for multiple strikes against a large target set, as well as repeated HPM strikes against individual targets. With nuclear propulsion, the missile would have unlimited range and could stay airborne for weeks or months and attack from any direction. There is considerable speculation as to size, with some estimates being 1½ - 2 times larger than a Kh-101 missile, or more. The missile had a successful test on 5 October 2023 according to President Putin. The number of Burevestniks to be produced is unknown.

According to the 2023 FAS estimate, the total number of Russian nuclear warheads is 1,197 for ICBMs, 896 for SLBMs and 580 for bombers, for a grand total of 2,673 warheads. These 2023 forces have the capability to be upgraded to 2,337 ICBM warheads, 1,216-1,536 SLBM warheads, and 766 bomber warheads, for a grand total of 4,319-4,639 warheads, depending on force loadings. For 2043, there could be 2,726-3246 ICBM warheads, 1,370-1,704 SLBM warheads, and 792 bomber warheads, for a grand total of 4,888-5,742 warheads. Numbers do matter. If the Yars and Bulava carried 10 small (90 kg/75-100 kt) warheads, that would add an additional 1,012 WH. The Sarmat carrying 50 small warheads would add another 1,500—but smaller warheads may also require greater accuracy.

If advanced technology nuclear weapons enable theater nuclear warfare to achieve national interests, what are the implications for strategic nuclear warfare?

- Col-Gen Muravyev, Deputy Commander-in-Chief of the Russian Strategic Missile Forces, stated that “Strategic missile systems should be capable of conducting ‘surgical’ strikes... using both highly accurate, super-low yield nuclear weapons, as well as conventional ones...” and that “...groupings of non-nuclear MBR (ICBM’s) and BRPL (SLBM’s) may appear...” – Moscow *Armeyskiy Sbornik*, 1 December 1999.
- Viktor Mikhaylov, former Minister of Atomic Energy, stated “existing strategic nuclear warheads are to be upgraded so they can be rapidly and simply reprogrammed to deliver strikes with a yield of hundreds of tons of TNT “...and reprogrammed [back].”¹⁵
- Russia reportedly has deployed precision nuclear warheads with 50-200-ton yields on some Layner and Bulava SLBMs, as well as Kh-102 cruise missiles. The Yars ICBM

¹⁵ Viktor Mikhaylov, in “Russia Mulls ‘Precision Use of Nukes,’” Moscow, *Segodnya*, May 6, 1999. By Pavel Felgengauer. Translated in Foreign Broadcast Information Service, Doc. ID: FTS19990506000851.

can carry the same warhead as the Bulava SLBM. (If so, is it possible that their improved accuracy is aided by Glonass?)

- Russian SNF policy, strategy, and forces (numbers, types, and capabilities) are undergoing significant changes to ensure Russia retains its status as a great power.
- Without accurate information on Russian SNF to inform the American public of the scope and character of the Russian threat, it becomes impossible for the United States to formulate a credible deterrence policy, strategy, and force structure to maintain U.S. security and national interests, especially in light of China's massive strategic nuclear breakout creating a two-nuclear-peer dilemma for the United States.

In short, strategic nuclear forces armed with new technology nuclear warheads provide game-changing capabilities.

The following is an analysis based on a 1986 study titled "The Consequences of 'Limited' Nuclear Attacks on the United States."¹⁶ In the Soviet attack against U.S. strategic nuclear forces, there were a total of 1,215 SNF targets and 2,837 warheads were used, with most targets getting both a 0.5-1 MT air and ground burst weapon, for a total of 1,342 MT. The targets consisted of ICBM silos, bomber bases, SSBN bases, nuclear C3, early warning radars and nuclear weapon storage sites. Casualties from the Soviet nuclear attack on U.S. SNF targets and resulting fatalities were as follows: Blast & Fire casualties—14.7-19.7 million; Fallout casualties—6.8-60.6 million, using February and October wind patterns; Total U.S. casualties—21.5-80.3 million.

Repeating the Soviet attack using essentially the same target set, but with updated numbers (e.g., 400 vs. 1,016 ICBM silos) and applying accurate, low yield weapons (only a single airburst weapon was necessary), casualties were significantly reduced: Blast & Fire casualties—12-16,000; Fallout casualties—None; Total casualties--12-16,000 (approximately the same target set).

According to Mikhaylov, nuclear weapons were so terrible that no one dared to use them: "The [Russian] nuclear shield, which hundreds of billions of dollars were spent developing, has today become a useless, burdensome pile of metal."¹⁷ He further stated that thermonuclear weapon development philosophy changed from high-yield weapons creating massive destruction to very low-yield weapons with political/military utility enabled by highly accurate guidance. This is why Mikhaylov was advocating, and Yeltsin approved the creation of a force of 10,000 accurate, low-yield and tailored effects nuclear weapons to "once again make nuclear weapons an instrument of policy."¹⁸

Food for thought.

¹⁶ William Daugherty, Barbara Levi, and Frank von Hippel, "The Consequences of 'Limited' Nuclear Attacks on the United States," *International Security*, Vol. 10, No. 4 (Spring 1986), pp. 3-45.

¹⁷ Mikhaylov in "Russia Mulls 'Precision Use of Nukes'," *Moscow, Segodnya*, May 6, 1999, op. cit.

¹⁸ Ibid.

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Introduction

The age of Minimum Deterrence is over, or at least it should be. The modernisation and build-up of Russian and Chinese nuclear forces make that inevitable. Since the end of the Cold War, many in western defence communities have largely neglected nuclear strategy. Those that have engaged with the subject, with some notable exceptions, have tended to fall into two, not mutually exclusive, camps. Firstly, there are those who subscribe to the disarmament agenda, often with the ultimate objective of a nuclear free world. Secondly, those who accept the necessity of the continued possession of nuclear weapons often do so within a minimum deterrence framework. The latter refers not only to small numbers of warheads, but also limited detail on operational matters. These approaches have found policy expression in certain U.S. administrations (most obviously under Obama) and UK nuclear weapons policy. At different times, both countries have sought to set the agenda by either reducing warhead numbers and/or deliberately de-emphasising nuclear weapons in national security policy.

In response to Russian and Chinese developments, Western powers have had to reassess their nuclear weapons policy. This paper focuses on the response of the United Kingdom, perhaps acting as an indicator of more general trends in Western nuclear strategy during the third decade of the twenty-first century. It will identify several positive and negative steps in the process of response. The paper concludes that the UK is now better placed to deal with the challenges of a deteriorating security environment, but that there is more that needs to be done.

The Positives

Adaptive Security Policy

In 2021, the UK government published *Global Britain in a Competitive Age, the Integrated Review of Security, Defence, Development and Foreign Policy*. In response to the deteriorating security environment, most notably Russia's invasion of Ukraine and attendant aggressive nuclear rhetoric, in 2023 the government published an updated policy, *Integrated Review Refresh 2023: Responding to a more contested and volatile world*. This integrated policy refresh was supplemented by a new *Defence Command Paper*, which was introduced earlier than originally intended. Taken together, this rush of defence and security policy documents reveals that the UK is not standing still, but is rather acting responsively to the growing threat from Russia.

Increased Budget

In support of its evolving security policy, the UK has allocated an additional £9 billion over five years for what it describes as the UK's "defence nuclear enterprise." This extra

funding will be invested in infrastructure, maintenance, and skills to support the submarine fleet and “increase the capacity and capability of our nuclear enterprise over the coming decades.”¹⁹ Additional funding is welcome as it provides concrete evidence that the UK’s commitment to its nuclear forces is not merely rhetoric.

Robust Language

That is not to say that language and public statements are unimportant. The nuclear theorist Thomas Schelling is clear that language and behaviour are essential components of an effective nuclear posture.²⁰ In that vein, government ministers have used quite robust language when responding to Russian threats and nuclear sabre rattling. For example, in October 2022, in a statement to the House of Commons, the then-Secretary of Defence, Ben Wallace, noted that “The resolve [of NATO members to support Ukraine] is absolutely rock solid. When it comes to the nuclear issue, the line is consistent that there would be severe consequences for Russia if it uses tactical nuclear weapons.”²¹ In its policy statements, Britain has not given any indication that it is intimidated by Russian nuclear threats.

Trident Replacement

From a capability perspective, it is significant that Britain has continued its commitment to stay in the nuclear game. Although the decision to replace Trident was initially made in 2006, and further endorsed by the House of Commons in 2016, it is still noteworthy that in a period of economic uncertainty the UK continues to see the necessity of nuclear forces. The significance of this decision is especially evident when one considers that the cost of Trident replacement is estimated at £31 billion, with a £10 billion contingency. This is not a small amount for a country with a defence budget of just over £55 billion.

Increased Warhead Cap

Of arguably even greater significance is the decision to increase the UK’s warhead cap to 260. This is a significant policy change. Prior to 2021, Britain had aimed at a warhead reduction from 225 to 180 warheads by the mid-2020s. There has been much speculation on the motives behind the decision to increase Britain’s nuclear arsenal. Some have suggested that it is designed to increase the number of so-called “sub-strategic” Trident warheads, and

¹⁹ Ministry of Defence, *Defence’s Response to a more Contested and Volatile World*, 18th July 2023, available at https://assets.publishing.service.gov.uk/media/64b55dd30ea2cb000d15e3fe/Defence_Command_Paper_2023_Defence_s_response_to_a_more_contested_and_volatile_world.pdf, p.56.

²⁰ Thomas C. Schelling, *Arms and Influence*, (New Haven, CT, Yale University Press, 1966), Thomas C. Schelling, *The Strategy of Conflict* (Cambridge, MA: Harvard University Press, 1980).

²¹ James Goddard, *War in Ukraine: Could Russia Use Nuclear Weapons?*, House of Lords Library, 24th November, 2022, available at <https://lordslibrary.parliament.uk/war-in-ukraine-could-russia-use-nuclear-weapons/>.

thereby give Britain greater operational flexibility.²² Meanwhile, the Ministry of Defence and the Secretary of Defence have cited heightened Russian threats, including modernisation, especially in its missile defence capabilities.²³ The decision to increase warheads was taken in 2021, before the invasion of Ukraine. It will be interesting to see if additional increases are announced as the nuclear threat from Russia intensifies. At the moment, it seems unlikely that Britain would go beyond 260. Nonetheless, it is worth noting that the UK did once have over 500 nuclear warheads.

Nuclear Posture Flexibility

Flexibility in nuclear posture has also been slightly enhanced by changes to the negative security guarantee and an increase in the policy of strategic ambiguity. On the former, the UK now reserves the right to reassess its security guarantees on the basis of increased threats from chemical and biological weapons, or from emerging technologies. On strategic ambiguity, the UK will no longer provide “public figures for our operational stockpile, deployed warhead or deployed missile numbers.”²⁴ This is noteworthy, because prior to this change the UK was one of the more transparent of the nuclear powers. Taken together, these two changes suggest that the UK is taking the operational aspects of nuclear strategy more seriously.

Lingering Negatives

Arms Control and Disarmament

As noted, the UK is increasing its nuclear arsenal. That does not mean, however, that the UK is abandoning the ultimate objective of multilateral nuclear disarmament. Indeed, although the government recognises that the arms control and disarmament architecture has been eroded, in the 2023 *Integrated Review Refresh* the government confirmed that it remains committed to the full implementation of the Nuclear Non-Proliferation Treaty (NPT).²⁵ As

²² Claire Mills, *Integrated Review 2021: Increasing the Cap on the UK's Nuclear Stockpile*, House of Commons Library, 19th March 2021, available at <https://commonslibrary.parliament.uk/research-briefings/cbp-9175/>.

²³ Heather Williams, *UK Nuclear Weapons: Beyond the Numbers*, War on the Rocks, 6th April 2021, available at <https://warontherocks.com/2021/04/u-k-nuclear-weapons-beyond-the-numbers/>.

²⁴ HM Government, *Global Britain in a Competitive Age: The Integrated Review of Security, Defence, Development and Foreign Policy*, March 2021, available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/975077/Global_Britain_in_a_Competitive_Age_the_Integrated_Review_of_Security_Defence_Development_and_Foreign_Policy.pdf, p. 77.

²⁵ Cabinet Office, *Integrated Review Refresh: Responding to a More Contested and Volatile World*, 13th March 2023, available at <https://www.gov.uk/government/publications/integrated-review-refresh-2023-responding-to-a-more-contested-and-volatile-world>.

noted by the MoD, “The UK has taken a consistent and leading approach on nuclear disarmament.”²⁶

Why is the UK’s position on arms control and disarmament important? By remaining committed to a world without nuclear weapons, the UK may give the impression that it is a reluctant nuclear weapons power. In this sense, akin to David Trachtenberg’s analysis of the United States’ *2022 Nuclear Posture Review*, there is a degree of schizophrenia about the UK’s nuclear posture.²⁷ On the one hand, the UK has taken steps to bolster the credibility of its nuclear deterrence. On the other hand, its statements on disarmament may lead one to suggest that Britain sees little positive strategic use for nuclear weapons beyond its stated strategy of minimum nuclear deterrence. As noted earlier, language and behaviour impact bargaining reputation in the challenging world of nuclear deterrence and compellence. Ultimately, the UK is giving off somewhat mixed messages in an increasingly threatening and competitive security environment.

Whilst it is conceptually correctly to note the potential negative strategic impact of Britain’s continued commitment to the NPT, there are two qualifying statements that need to be made. Firstly, there is an air of pragmatism about the commitment, in that the UK recognises that the NPT can only be fully implemented when the international security environment allows such a step. Secondly, there is a notable tonal difference in the 2023 and 2021 documents. The 2021 *Integrated Review* contains a long paragraph on nuclear disarmament, in which the UK proudly states that it has the smallest stockpile of the major powers and the only one with a single delivery system. These arms control badges of honour are absent from the 2023 *Review Refresh* and *Defence Command Paper*.

Single Delivery System

Since 1998, the UK remains the only major nuclear power with a single delivery system. This is problematic. Sticking to a single delivery system limits Britain’s operational and strategic flexibility. Clearly, Britain sees the need for increased operational flexibility, as is evidenced by its introduction of sub-strategic warheads. However, the glaring problem with Britain’s current stance is that when a Trident missile is launched it will not be apparent to the intended target the number of warheads the missile is carrying, or the warhead yields. What Britain intends as a sub-strategic attack may be perceived as a much larger strategic strike. Indeed, as noted by Mark B. Schneider, one of the declared scenarios for possible Russian nuclear usage is “arrival of reliable data on a launch of ballistic missiles attacking the

²⁶ Ministry of Defence, *The UK’s Nuclear Deterrent: What You Need to Know*, available at <https://www.gov.uk/government/publications/uk-nuclear-deterrence-factsheet/uk-nuclear-deterrence-what-you-need-to-know>.

²⁷ David J. Trachtenberg, “The 2022 Nuclear Posture Review: A Case of Schizophrenia,” in Keith B. Payne (ed), *Expert Commentary on the 2022 Nuclear Posture Review*, Occasional Paper, 3/3, March 2023, National Institute for Public Policy, available at <https://nipp.org/wp-content/uploads/2023/02/OP-Vol.-3-No.-3.pdf>.

territory of the Russian Federation and/or its allies.”²⁸ It is proposed, therefore, that for the so-called sub-strategic role, Britain requires a distinctly different means of delivery. A return to an air-launched system would provide such a capability. One possible option is to go down the French route, with the SSBN force supplemented with sea (carriers) and land-based air-launched nuclear options. Air-launched systems would give Britain the ability to forward deploy nuclear weapons to signal resolve. Unfortunately, there are no easy options in this respect. Britain could potentially adapt low-yield warheads for delivery via its F35B fleet, or more easily choose to buy the A version of the F35.²⁹

Minimum Deterrence

Ultimately, the above problems stem from the third negative, Britain’s commitment to minimum deterrence. The UK government defines minimum deterrence as “the minimum amount of destructive power needed to guarantee our deterrent remains credible and effective against the full range of state nuclear threats.”³⁰ This is a logical, but quite bold statement. One wonders whether Britain’s extant force structure and posture can continue to produce this deterrent effect in the face of expanding adversary arsenals. Can a minimum deterrence posture adjust to changes in adversary capabilities and doctrine ad infinitum? Can it deal with an expanding range of threatening contingencies? Can it deal with escalation?

It is undoubtedly true that the UK has limited resources to commit to its nuclear forces. Britain cannot match the arsenals of the United States, Russia or China. As a follow-on, nor can it develop the range of operations common to the larger nuclear powers. However, as potential adversaries, especially Russia, continue to develop more flexible force postures, if Britain is to deter the widening range of threats it must increase its own flexibility. As noted above, this will likely require an additional delivery option for its sub-strategic warheads. It will also require greater engagement with operational issues in a post-deterrence world. At minimum, Britain must have some capability to respond with nuclear weapons at different levels of escalation, perhaps including a limited battlefield role. On the positive side, Britain continues to reject a no-first-use option in its nuclear posture.

Moreover, there is the challenge of operationalising minimum deterrence. With limited nuclear warheads, inflicting the required amount of destruction on the enemy may be challenging. This is especially the case if the enemy has superior forces, and the UK restricts itself to counterforce targets. Countervalue targeting, attacking the adversary’s political, industrial and population centres, introduces no less severe problems. As indicated in a

²⁸ Mark B. Schneider, *How Many Nuclear Weapons Does Russia Have? The Size and Characteristics of the Russian Nuclear Stockpile*, Occasional Paper, 3/8, August 2023, p. 32, National Institute Press, available at <https://nipp.org/wp-content/uploads/2023/09/Vol.-3-No.-8.pdf>.

²⁹ Wyn Bowen and Geoffrey Chapman, *The UK, Nuclear Deterrence and a Changing World*, Freeman Air and Space Institute, King’s College London, available at <https://www.kcl.ac.uk/warstudies/assets/kcl-fasi-paper13-uk-nuclear-deterrence-changing-world-web.pdf>.

³⁰ Ministry of Defence, *What You Need to Know*, op. cit.

recent study by Keith Payne, such an approach raises extraordinary moral and legal problems, and consequently undermines the credibility of deterrence, especially in relation to limited provocations.³¹

Conclusion

Overall, within the limits of its resources, the UK has responded reasonably well to increased nuclear threats from Russia. As a result, the flexibility and credibility of Britain's nuclear posture have arguably been enhanced. However, the lingering commitment to the NPT, single delivery system, and minimum deterrence, somewhat undermine the good work that has been done. If Britain remains in the nuclear game, it must do so fully. That is to say that it must abandon minimum deterrence as a guiding principle. In particular, Britain must embrace a wider range of nuclear operations and acquire the capabilities that support such a stance. Only then can it have a more flexible credible deterrence posture and be able to make an effective contribution should deterrence fail. Undoubtedly, such a change in nuclear posture would require difficult policy decisions. However, as is reflected in the 2023 policy documents, the security environment is deteriorating rapidly and requires an appropriate response.

³¹ Keith B. Payne, *The Rejection of Intentional Population Targeting for "Tripolar" Deterrence*, Occasional Paper, 3/9, September 2023, National Institute for Public Policy, available at <https://nipp.org/wp-content/uploads/2023/09/Vol-3-No-9.pdf>.