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Trimming Nuclear Excess

Options for Further Reductions of U.S. and Russian Nuclear Forces

By HANS M. KRISTENSEN

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Abbreviations

ACDA: Arms Control and Disarmament Agency
AFB: Air Force Base
ALCM: Air-Launched Cruise Missile
AS: Air-to-Surface
ASW: Anti-Submarine Warfare
B: Bomb
CMRR-NF: Chemistry and Metallurgy Research Replacement - Nuclear Facility
DCA: Dual-Capable Aircraft
DOD: U.S. Department of Defense
DOE: Department of Energy
ICBM: Intercontinental Ballistic Missile
LRSO: Long-Range Standoff Missile
MIRV: Multiple Independently Targetable Reentry Vehicle
Mk: Mark
NATO: North Atlantic Treaty Organization
NPT: Non-Proliferation Treaty
NPR: Nuclear Posture Review
OPLAN: Operations Plans
RUB: Rubles
SAM: Surface-to-Air Missile
SLBM: Sea-Launched Ballistic Missile
SLCM: Sea-Launched Cruise Missile
SRF: Strategic Rocket Force
SSBN: Nuclear-Powered Ballistic Missile Submarine
SSBNX: Next-Generation Nuclear-Powered Ballistic Missile Submarine
SSGN: Nuclear-Powered Guided Missile Submarine
SSM: Surface-to-Surface Missile
START: Strategic Arms Reduction Treaty
STRATCOM: U.S. Strategic Command
Su: Sukhoi
TLAM/N: Nuclear Tomahawk Land-Attack Cruise Missile
Tu: Tupolev
UPF: Uranium Production Facility
W: Warhead

Foreword

This timely FAS Special report is published intentionally before the start of President Barack Obama's second term to guide him and his national security team as they make decisions about further nuclear arms reductions between the United States and Russia. As President Obama made clear at the beginning of his first term in a major speech in Prague, he has committed the United States to "take concrete steps towards a world without nuclear weapons." In addition, he pledged to "maintain a safe, secure and effective arsenal to deter any adversary." During his first term, his administration and the U.S. Senate took a modest step to further reduce deployed strategic nuclear weapons alongside Russia by enacting the New START Treaty. President Obama has expressed strong interest in taking more moves to lower the levels of nuclear arms.

President Obama and his team can address much of the political opposition he will likely face by following the core principles of enhancing crisis stability, addressing asymmetries in nuclear forces between the United States and Russia, and saving scarce U.S. federal money, as Hans Kristensen, Director of the FAS Nuclear Information Project, adheres to in this FAS Special Report.

Both the U.S. and Russian presidents need to be assured that if they are in a crisis, they have nuclear forces that would survive a first strike. Mr. Kristensen recommends improving crisis stability by only having single-warhead land-based intercontinental ballistic missiles and by reducing the warhead loading on sea-based ballistic missiles. Such a posture reduces the concern that one side could destroy the other's nuclear forces. Moreover, he discusses measures to further lengthen the nuclear fuse and give the political leaders more time to make decisions in a crisis.

The United States and Russia have some significant differences in their nuclear forces. The United States, with a tradition of a strong navy, has been able to maintain a much greater number of ballistic missile submarines at sea while Russia has struggled to even have a few patrols annually in the past several years. Russia, on the other hand, has kept many more non-strategic nuclear weapons than the United States partly in order to counter NATO's superior conventional forces. While a strict parity or matching of each other's forces is not perceived to be imperative as it was during the Cold War, Mr. Kristensen righty warns, "If the asymmetry becomes too great, it can begin to affect perceptions about intentions, modernization plans, planning and crisis stability." He provides sound guidance for how to address these festering asymmetries.

Finally, in an age of fiscal austerity, the United States needs to take responsible action to make necessary cuts in nuclear forces. Such action will not only save money, but if done smartly, as outlined in this FAS Special Report, will make the United States more secure.

Charles D. Ferguson
President, Federation of American Scientists
December 2012

Introduction

The United States and Russia have significantly reduced their nuclear arsenals since the end of the Cold War. The U.S. nuclear weapons stockpile has declined from more than 19,000 in 1991 to approximately 4,650 today. The history of the Russian stockpile is less well known but is estimated to have declined more than five-fold in the same time period from about 30,000 warheads to roughly 4,500 today (see Figure 1).[1]

In the same period, the United States and Russia have reduced the number of warheads they deploy with strategic delivery vehicles from 10,000 and 9,000 warheads, respectively, to roughly 1,950 and 1,740 warheads.

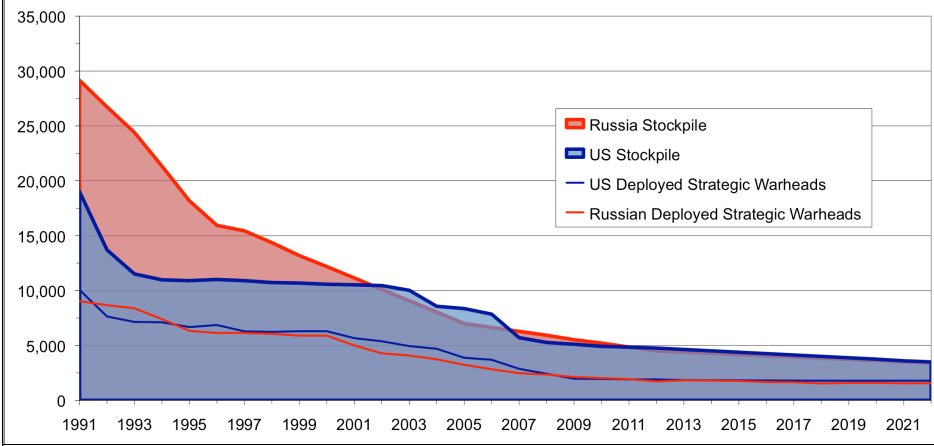
Likewise, since 1991, it is estimated that Russia has reduced its inventory of non-strategic nuclear warheads by 85 percent from roughly 13,200 to approximately 2,000 today. The United States reduction of non-strategic nuclear warheads has been about 93 percent, from 7,600 to 500.

These are impressive reductions by any standard – and they should be. Comparing with Cold War force levels, however, is becoming less interesting and relevant. Russia and the United States currently hold more than 90 percent of the world's total inventory of nuclear warheads.[2] What is important now is to think about what role the remaining nuclear forces need to serve as the nuclear weapons states reduce them further toward, ultimately, zero, and what steps are needed to keep the reduction momentum going.

Despite its merits (and it has many), the New START Treaty only has a limited effect on U.S. and Russian nuclear forces.[3] The treaty only regulates a limited (but important) portion of the total forces, it has no direct effect on the number of nuclear warheads the two countries possess, and it does not require destruction of a single nuclear warhead. The number of deployed strategic warheads of the two countries will only be marginally smaller than today when the treaty's limits take full effect in 2018 – and it expires three years later (unless the Parties extend it).

There are indications that, although U.S. and Russian reductions are continuing, both countries are becoming more cautious about reducing further. The drawdown of forces has slowed since 2007 (see Figure 1) and both countries are now investing huge sums of money in new nuclear weapon systems that are designed to operate toward the end of the century. Unless new unilateral reductions take place or significant arms control agreements are reached, large nuclear forces could be retained far into the future.

Figure 1:
Estimated U.S. and Russian Nuclear Stockpiles and Deployed Strategic Warheads



U.S. and Russian nuclear weapons stockpiles have declined four and more than five-fold, respectively, and their deployed strategic warheads more than five-fold since 1991, but the drawdown appears to be slowing. In addition to these stockpiles warheads, several thousand retired –but still intact – warheads are awaiting dismantlement.

To keep momentum in the nuclear arms reduction process, the United States and Russia need to reinvigorate it with new unilateral and bilateral initiatives. In order to do that, they need to better balance their nuclear force sustainment and modernization plans with their stated commitments and obligations to reducing nuclear forces in pursuit of nuclear disarmament. Indeed, after a few years of arms control talk and one treaty, it appears that momentum has now shifted to *modernizing* nuclear forces rather than *reducing* them. This may not be intended, and perhaps even wrong, but it is a growing impression in the international community.

In his 2009 Prague speech, President Barack Obama committed the United States to nuclear reductions and to maintain adequate nuclear forces while working toward the elimination of all nuclear weapons. The New START Treaty was one initial step in the process, but the *fundamental* message in the speech was to "put an end to Cold War thinking" by reducing the role of nuclear weapons in U.S. national security strategy, and urging others to do the same.[4] Putting an end to Cold War thinking is a tall order, and the Obama administration should use its pending nuclear targeting review to explain what that means.

Russian statements have been more muted. Russian Deputy Foreign Minister Sergei Ryabkov recently insisted that "talks on nuclear arms reduction cannot continue without taking into account a number of factors that influence strategic stability," such as U.S. plans to deploy missile defense in Europe.[5] And rather than another bilateral treaty with the United States, he said: "We proceed from the understanding that further steps in the field of nuclear arms reduction and limitation must be multilateral."[6]

Now that the U.S. presidential election is over, President Obama should once again make nuclear arms control a prominent and visible part of his foreign policy agenda. The financial crisis will probably help by making simple and quick reductions more attractive to save money in the short term. Fortunately, there are several changes that can and should be made to the U.S. nuclear posture that does not require negotiating a new treaty.

This includes implementing force reductions planned under the New START Treaty as soon as practically possible instead of delaying this to the end of the decade. Most important among these is the decision to reduce by four the missile loading on each Ohio-class ballistic missile submarine (SSBN) and downloading and reducing the Minuteman III intercontinental ballistic missiles (ICBMs). The SSBN missile reduction should be doubled, however, and combined with reducing the SSBN fleet by two boats. Doing so would implement now the SSBN force structure that has already been decided for the 2030s.

The reduction of the SSBN fleet and its missile loading is necessary to reduce the significant asymmetry between U.S. and Russian nuclear forces that has gradually evolved since the end of the post-Cold War. The effect of Russia's declining military production capacity combined with the Moscow Treaty and the New START Treaty allowing each side to structure their forces as they wish below an overall limit, have resulted in a U.S. posture characterized by many delivery vehicles each with fewer warheads, and a Russian posture characterized by fewer deliver vehicles each carrying more warheads. This asymmetry will likely deepen as the United States de-MIRVs its ICBMs and Russia reduces its missile force further and deploys new missiles with MIRV (see Table 2). (MIRV means multiple independently targetable re-entry vehicles, i.e., having more than one warhead per missile.)

Table 2:
Maximum and Counted U.S. and Russian Nuclear Forces 2012, 2022

	2012				2022			
	United States		Russia		United States		Russia	
Categories	**Total Capacity**	**New START**	**Total Capacity**	**New START**	**Total Capacity**	**New START**	**Total Capacity**	**New START[a]**
Strategic								
Launchers[b]	880	806	549	491	700	700	575	420
Warheads[c]	4154	1722	2440	1499	3400	1550	2400	1330
Non-Strategic								
Launchers	?	n.a.	?	n.a.	?	n.a.	?	n.a.
Warheads	500	n.a.	~2000	n.a.	200	n.a.	~1000	n.a.
Stockpile	**4654**		**~4500**		**~3600**		**~3400**	
Retired/ awaiting dismantlement	~3000		~4000		~1200		few	
Total Inventory	**~7700**		**~8500**		**~4800**		**~3500**	

[a] The New START Treaty expires in February 2021.
[b] Total launchers include all active ICBM silos, launched SSBNs and nuclear-capable bombers. New START launchers include declared aggregate numbers as of September 1, 2012, and those that would have been counted by 2022 had the treaty still been in force.
[c] Total warheads include deployed and reserve warheads.

On the one hand, symmetry of U.S. and Russian nuclear forces is no longer nearly as important as it was during the Cold War. Indeed, it is a good sign that the two countries are not as obsessed with matching the other side's nuclear force level. On the other hand, U.S. and Russian nuclear force planners still very much look to how the other side is structuring its nuclear forces, and both sides maintain significant nuclear strike plans against the other side's nuclear forces. If the asymmetry becomes too great, it can begin to affect perceptions about intentions, modernization plans, planning and crisis stability.

Seen from Washington, the asymmetry is not an issue because it is in the U.S. favor. Even though the United States has many more ICBMs than Russia, the large U.S. force is considered stabilizing because it would reduce a Russian incentive to launch a first strike in a hypothetical crisis, especially as the deployed U.S. ICBM force will soon consist solely of single-warhead missiles. Indeed, the U.S. military appears to be very confident in its nuclear posture. A recent assessment by the U.S. Department of Defense (DOD) of Russia's

nuclear force structure and strategic stability issues concluded that even if Russia deployed a "significant" number of additional nuclear warheads above the limits of the New START treaty, this "would have little to no effect" on the U.S. assured second-strike capabilities that underwrite the strategic deterrence posture. In fact, Russia "would not be able to achieve a militarily significant advantage by any plausible expansion of its strategic nuclear forces, even in a cheating or breakout scenario under the New START Treaty," DOD concluded.[7] This suggests that the U.S. has a lot of potential for reducing its nuclear forces further – with or without Russian reciprocity.

Seen from Moscow, however, the much larger U.S. force of ICBMs and SLBMs - especially when considering the significant reserve of additional warheads that could increase the warhead loading in a crisis - probably appears less comforting. Indeed, growing asymmetry already appears to be fueling modernization plans in an attempt to keep up with the U.S. force level. Examples of this include the introduction of a MIRV'ed SS-27 (RS-24) and the apparent decision to develop a new "heavy" ICBM.

The concern of the growing asymmetry is not that a nuclear attack from either side is likely, but that the disparity will fuel mistrust and drive worst-case planning and unnecessarily dynamic posturing that will complicate efforts to reduce nuclear weapons further.

To counter this development, it is necessary to move quickly to reducing the asymmetry of strategic nuclear forces. Some of these steps will require negotiations and perhaps even a treaty; others can be done unilaterally. Initially, the United States needs to reduce its SSBN posture and significantly curtail its inventory of non-deployed "hedge-warheads" that are intended to increase warhead loading on ballistic missiles in a crisis. A second needed initiative is to reduce the U.S. ICBM force to a level that is more compatible with the Russian ICBM force. This second step should be accompanied with a Russian reduction of warhead loading on its new ICBMs. Russia should also curtail the capacity of its new Borei-class SSBN to avoid an increase in missiles and warheads on the sea-based leg of its strategic nuclear triad.

These and many more suggestions for reducing U.S. and Russian nuclear forces are described further in the report below, which begins with an overview of the status of U.S. and Russian nucler forces, and ends with conclusions and detailed recommendations.

United States Nuclear Posture: Status and Trends

The Department of Defense (DOD) stockpile currently includes approximately 4,650 nuclear warheads for delivery by more than 800 ballistic missiles and aircraft. Of these, approximately 1,950 strategic warheads are thought to be deployed on strategic ballistic missiles and at bases with deployed nuclear-capable heavy bombers; an additional 200 non-strategic nuclear warheads are at bases with operational aircraft. Another 2,500 strategic and non-strategic warheads are thought to be in storage for potential uploading onto delivery platforms if necessary or as replacements if one or more warhead types develop technical difficulties. Another 3,000 retired, but still intact, warheads in Department of Energy (DOE) custody are awaiting dismantlement (see Table 3).[8]

In order to meet the limitations of the New START Treaty of no more than 1,550 accountable deployed strategic warheads and 700 accountable deployed strategic delivery vehicles by 2018, the DOD is currently dismantling so-called "phantom" platforms that are not assigned nuclear warheads but count against the treaty limit because of nuclear-capable equipment. Later in the decade, reduction of nuclear-armed missiles will begin to trim the deployed nuclear forces to no more than 420 ICBMs, 240 SLBMs and 60 bombers. As a result, by the early 2020s the arsenal might include 700 deployed launchers with 1,790 warheads; under New START rules, this force would count as only 1,550 deployed strategic warheads, since nuclear-capable bombers are counted as only one warhead, regardless of the number they may be assigned. An additional 1,800 warheads in reserve for a total stockpile of roughly 3,600 warheads (see Table 3).

Future decisions may reduce the warhead level, for example in response to the Obama administration's ongoing, but delayed, review of nuclear targeting and alert level requirements.[9]

Ballistic Missile Submarines: The Navy currently operates a fleet of 14 Ohio-class SSBNs based at two bases. Each SSBN is equipped with 24 launch tubes for the Trident II D5 SLBM. At any give time, two of the SSBNs are in overhaul. Of the remaining 12 boats, eight to nine are at sea of which four to five are on "hard alert" in their designated patrol areas holding at risk target packages in Russia and China as tasked under the strategic war plan (OPLAN 8010). Each SLBM is loaded with four to five W76-0, W76-1 or W88/Mk5 warheads for a total of approximately 1,150 deployed warheads. As many warheads are in storage in case of technical failure in the deployed warheads or to increase the warhead loadings in the event of a geopolitical surprise, such as a Russian decision to quit the New START Treaty.

Table 3:
Estimated U.S. Nuclear Forces, 2012-2022

Type	2012 Total Launchers[a]	2012 Associated Warheads Deployed	2012 Associated Warheads Reserve	2022 Total Launchers[a]	2022 Associated Warheads Deployed	2022 Associated Warheads Reserve
ICBM	450	500[b]	350	400	400[c]	300
SLBM	288	1,152	1,152	240	1,090	830
Bombers	60	(300)[d]	700	60	300	500
Subtotal	*798*[e]	*1,952*[f]	*2,202*	*700*	*1,790*	*1,630*
Non-Strategic	?	200	300[g]	?	0	200
Stockpile		**4,654**			**3,620**	
Awaiting Dismantlement		~3,000			~1200	
Total Inventory		~7,700			~4,820	

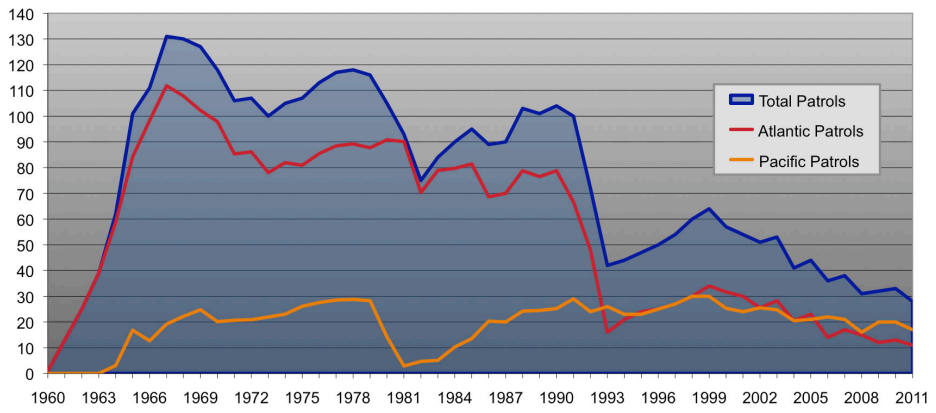
[a] Only counts launchers that are assigned nuclear missions.
[b] The Air Force is in the process of downloading the ICBM force to single warhead. A significant re-MIRVing capacity will be retained.
[c] The ICBM force will probably be reduced to 400 missiles, possibly fewer, and retain upload capability.
[d] Although bombers do not carry nuclear weapons under normal circumstances, a few hundred weapons are thought to be present at Minot AFB and Whiteman AFB. These weapons are not counted under New START.
[e] Counts all launchers assumed to be assigned a nuclear mission. The New START Treaty count as of September 2012 was 806 *deployed* strategic launchers, an anomaly partly caused by counting some bombers that are not assigned nuclear weapons.
[f] The New START Treaty count as of September 2012 was 1,722 deployed strategic warheads, an anomaly partly caused by counting some bombers that are not assigned nuclear weapons, attributing only one weapon per bomber, and not counting weapons present at bomber bases.
[g] Approximately 260 warheads for Tomahawk Land-Attack Cruise Missiles (TLAM/N) have recently been retired.

One of the most significant force modernization decisions concerns the replacement of the Ohio-class SSBN. The Navy has chosen a design that is 2,000 tons bigger than the Ohio-class but with 16 missiles instead of 24 today (or 20 as planned from 2015).[10] Twelve replacement SSBNs (tentatively known as SSBNX) are planned, a reduction of two boats compared with the current fleet, at an estimated cost of $90.4 billion. Procurement of the first boat is scheduled for 2021 with deployment on deterrent patrol starting in 2031.[11]

At least during the first decade of its service life, the SSBNX will be armed with a life-extended version of the current Trident II D5 (D5LE) SLBM. The D5LE, which has a new guidance system designed to "provide flexibility to support new missions"[12] and make the missile "more accurate,"[13] will also be back-fitted onto existing Ohio SSBNs for the remainder of their service life, starting in 2017.

Operations of the SSBN force appear to be changing. Over the course of the past decade, the number of deterrent patrols has declined by approximately 50 percent from 64 in 1999 to 28 in 2011 (see Figure 2). The duration of each patrol can vary from 40 to 100 days, but the average is approximately 70 days. Most of the patrols (about 60 percent) take place in the Pacific, a change from ten years ago when the Atlantic SSBN fleet conducted the most patrols.

Figure 2:
U.S. Ballistic Missile Submarine Patrols 1960-2011



The annual number of U.S. SSBN deterrent patrols has fluctuated as the number of SSBNs has changed over the years. Since 2000, however, the number of patrols has declined by approximately 50 percent even though the SSBN fleet size has been stable.

Intercontinental Ballistic Missiles: The Air Force operates a force of 450 Minuteman III ICBMs deployed in missile fields at three bases. Virtually all of the missiles are on alert, ready to launch in a few minutes from receiving the launch order.

Most of the missiles carry one warhead each (W87 or W78), but a small number (25 to 50) are currently being downloaded from MIRV to single-warhead loading. The downloading program was started under the Bush administration, halted at 500 warheads, but

the Obama administration has decided to complete the downloading. An estimated 250 missiles are equipped with the W87 warhead, with the remaining 200 carrying the W78. In addition to the 450 to 500 deployed warheads, several hundred are in reserve to re-MIRV if so ordered. The W87 underwent an emergency life-extension ten years ago to fix structural problems in the warhead package, but production of a life-extended version of the W78 is scheduled for 2021-2024 with production of additional "hedge" warheads to continue through 2035.[14]

To meet the limits of the New START Treaty, the ICBM force will be reduced to probably 400 missiles in the second half of the decade. The Minuteman III, which is in the final phase of a multi-year $8 billion modernization program, is scheduled to remain in service through 2030, possibly longer. A study of a replacement ICBM has begun, including different basing options – possibly including mobile missiles.

Heavy Bombers: The Air Force currently operates a fleet of 20 B-2 and 93 B-52H bombers at three bases. Of those, 18 B-2s and 76 B-52Hs are nuclear-capable. Approximately 60 bombers, 16 B-2s and 44 B-52Hs, are nuclear tasked under the war plan.[15]

Each nuclear-tasked B-2 can carry up to 16 nuclear bombs (B61-7, B61-11 and B83-1). The nuclear-tasked B-52Hs are assigned air-launched cruise missiles (ALCMs). Although the B-52Hs can also carry gravity bombs, they are currently planned for delivery solely by the B-2. It is estimated that approximately 1,000 nuclear weapons, including 528 ALCMs, are assigned to the bombers. From the 2020s, the B-2 is scheduled to receive the planned B61-12 precision-guided nuclear bomb; a program currently estimated at more than $10 billion.

The Air Force is designing a new bomber intended to begin replacing existing bombers from the mid-2020s. Procurement of 80-100 aircraft is envisioned, some of which are planned to be nuclear-capable, at a cost of perhaps $55 billion. The new bomber might be equipped to deliver the planned B61-12 precision-guided bomb and B83-1 gravity bomb (if it is retained in the stockpile). The Air Force is also planning a nuclear ALCM, currently known as the Long-Range Stand-Off (LRSO) missile. The current ALCM is scheduled to remain operational through the 2020s, and the LRSO could either use a life-extended version of the ALCM's W80-1 warhead or a life-extended version of the retired W84 warhead that used to arm the Ground-Launched Cruise Missile (GLCM). The administration has promised that it will not produce new nuclear warheads. The LRSO program might cost as much as $1.2 billion, with more millions of dollars needed to produce the warhead.

Non-Strategic Nuclear Forces: The U.S. stockpile currently includes an estimated 500 warheads for delivery by non-strategic nuclear forces, a reduction of roughly 90 percent from the 1991 level. All are gravity bombs (B61-3, B61-4 and B61-10) for delivery by U.S. Air Force F-15E and F-16 aircraft, and NATO F-16 and PA-200 Tornado aircraft.

Nearly 200 bombs are deployed at six bases in five European countries.[16] The Navy's nuclear Tomahawk Land-Attack Cruise Missile (TLAM/Ns) has recently been retired, a significant milestone that marks the complete unilateral elimination of all U.S. naval non-strategic nuclear weapons.

Despite the general and consistent U.S. trend since the end of the Cold War to reduce and eliminate its non-strategic nuclear weapons, the Air Force is now planning a significant upgrade of its remaining dual-capable aircraft (DCA) capability. Starting in 2016, production will begin of a life-extended version of the B61-4 bomb, using selected components from the B61-3, B61-7, and B61-10 versions, incorporating new safety and security features, and adding a new precision-guided tail kit to improve the accuracy of the bomb. Starting in 2019, the new version (B61-12) is scheduled to arm U.S. and NATO DCAs in Europe and the United States under a $10 billion-plus program. The B61-12 will also be added to the stealthy (and expensive) F-35A Joint Strike Fighter in the 2020s.

Russian Nuclear Posture: Status and Trends

Russia does not disclose information about the size of its nuclear weapons stockpile, or publish the detailed categories of aggregate data produced under the New START Treaty.[17] Occasionally, official statements at NPT Review conferences have made reference to overall reductions, but without providing actual numbers. During the 2005 NPT Review Conference, for example, the Russian delegation declared that "compared to 1991, the total stockpile of nuclear weapons has been reduced more than fivefold," and that "Russia has cut down its arsenals of non-strategic nuclear weapons fourfold."[18] Since then, Russia has stopped updating these public announcements. Instead, at the 2010 NPT conference, the Russian government simply repeated the 2005 statement as if no additional reductions had been made during the intermediate five years.

In addition, the U.S. government, which during the Cold War published detailed estimates of Soviet nuclear forces, has stopped doing so and today provides essentially no information to the public about the size of the Russian nuclear arsenal.

As a result of this secrecy, uncertainty and worst-case rumors abound in the news media and international arms control community about the status and trend of Russian nuclear forces. Consequently, making reliable estimates is becoming more difficult. Instead of providing its own estimates, the Pentagon in 2012 cited unspecified unclassified estimates that "Russia has approximately 4,000 to 6,500 nuclear weapons…of which approximately 2,000-4,000 are non-strategic – or 'tactical' – nuclear weapons."[19] This report estimates that there are approximately 4,500 nuclear warheads left in the Russian stockpile, of which roughly 2,000 are non-strategic warheads (see Table 4).[20, 21]

What is clear, however, is that Russia already is below the New START Treaty limit and is not legally required to reduce its deployed strategic forces further. The aggregate data as of September 1, 2012, accredited Russia with 1,499 warheads on 491 deployed strategic delivery vehicles.[22] This corresponds to 51 warheads and 209 delivery vehicles below the treaty limit six years before the treaty's limits take full effect in February 2018.

While the published New START Treaty aggregate data provides a general overall snapshot of Russia strategic nuclear forces and some limited indications of how warheads are distributed, the limited data does not provide any information about how the ICBMs, SLBMs and bombers are structured. What is known is that the strategic forces are in the

Table 4:
Estimated Russian Nuclear Forces, 2012-2022

Type	2012 Launchers	2012 Associated Warheads		2022 Launchers	2022 Associated Warheads	
	Total	Deployed	Reserve	Total	Deployed	Reserve
ICBM	330	1,070	few	231	642	few
SLBM	144	350	180	172[a]	624	280
Bombers	76	(300)[b]	500	76	(250)[b]	550
Subtotal	*550*[c]	*1,741*[d]	*680*	*479*	*1,516*	*830*
Non-Strategic	?	0	~2000	?	0	~1000
Stockpile		**~4,500**			**~3,350**	
Awaiting Dismantlement		~4,000			few	
Total Inventory		~8,500			~3,350	

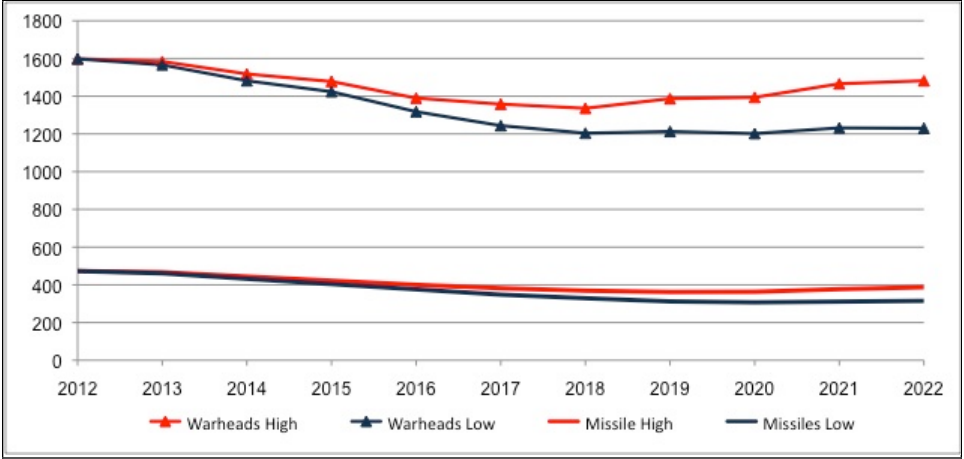
[a] Assumes the fourth and subsequent Borei-class SSBNs each have 20 missile tubes instead of 16 on each of the first three boats. If all will get 16 tubes, then the total number of SLBM launchers would be 160.
[b] Although bombers do not carry nuclear weapons under normal circumstances, a few hundred weapons might be present at bomber bases. These weapons are not counted under the New START Treaty.
[c] Counts all launchers assumed to be assigned a nuclear mission. The New START Treaty count as of September 2012 was 491 *deployed* strategic launchers, but the breakdown of deployed and non-deployed launchers is secret.
[d] The New START Treaty count as of September 2012 was 1,499 deployed strategic warheads, which includes one weapon per aircraft. But the breakdown of how many ICBMs, SLBMs and bombers are counted is secret.

middle of a generational transformation that involves phasing out four Cold War ballistic missiles and replacing them on a less than one-for-one basis with three new missiles. Russia reportedly spent $860 million (RUB27.4 billion) on nuclear armaments in 2012 and plans to spend $3.3 billion (RUB101.15 billion) on the nuclear complex in 2013-2015,[23] or an average of $1.1 billion. Through 2020, Russia plans to spend approximately $70 billion on its nuclear triad.[24]

The retirement of the four old systems will eliminate approximately 350 ICBMs and SLBMs by the early 2020s. To compensate, Vladimir Putin stated shortly before the 2012 election that Russia would produce "over 400" ICBMs and SLBMs in the next 10 years. Such a production rate of more than 40 missiles per year, which presumably includes missiles intended for deployment as well as those intended to replace missiles expended in missile tests, would be significantly above the production rate that Russia has demonstrated during the past decade.

Between 2002 and 2012, Russia deployed an average of six new ICBMs per year, retrofitted its Delta IV SSBNs with the Sineva missile (a modified SS-N-23), and produced perhaps two boatloads of Bulava missiles, or less than 200 missiles in total. It seems doubtful that Russia's military production complex, which is plagued by corruption and mismanagement, will be able to double missile production in the next decade. As a result, the strategic nuclear missile force might even decline further, even without a new arms control treaty, to just below 400 missiles with 1,480 warheads by 2022 (see Figure 3). The deployed force would be even smaller, perhaps 350 missiles with 1,260 warheads. The key variable in this projection is how many warheads each RS-24 carries (this report estimates three to four) and how many RS-24s Russia will be able to produce and deploy.

Figure 3:
Projected Russian Long-Range Ballistic Missiles Forces 2012-2022



The low estimate assumes deployment of six RS-24 ICBMs per year, the rate demonstrated during the past decade, and that all Borei-class SSBNs will have 16 missile tubes each. The high missile estimate assumes deployment of 12 RS-24 ICBMs per year and that the fourth and subsequent Borei-class SSBNs will have 20 missile tubes each. Both estimates assume slow deployment of a new "heavy" ICBM starting in 2018. The portion of the missile force that would be deployed at any given time would be even smaller.

Intercontinental Ballistic Missiles (ICBMs): The Russian Strategic Rocket Force (SRF) currently deploys approximately 330 ICBMs of five basic types: SS-18, SS-19, SS-25, SS-27 Mod 1 (Topol-M) and SS-27 Mod 2 (Yars, or SS-24). A little over half of the ICBMs are mobile. Approximately one-third of the missiles carry multiple warheads. The ICBM force is deployed at 11 locations and organized in 11 divisions under three Missile Armies.

Three old ICBMs (SS-18, SS-19 and SS-25) are being phased out. Nearly 400 have already been retired during the past decade, and the remaining 240 currently constitute about 70 percent of the ICBM force. By 2016, the old missiles will be reduced to 30 percent of the force, and the plan appears to be to retire the rest by the early 2020s.

To compensate for retirement of the old systems, Russia is deploying the SS-27 in two basic versions, but on a less than one-for-one basis: SS-27 Mod 1 (Topol-M) and SS-27 Mod 2 (Yars, or RS-24). Each exists in both fixed (silo) and road-mobile versions. Introduction of the single-warhead SS-27 Mod 1 began in 1997, and deployment will be completed this year with a total of 60 silo and 18 mobile missiles.

In 2010, as the START I Treaty expired, Russia started deploying a MIRVed version of the SS-27, known as SS-27 Mod 2 (Yars, or RS-24). Two regiments with a total of 18 launchers are already operational with the Teykovo division, and preparations began in 2012 to introduce the RS-24 at the Irkutsk and Novosibirsk division to replace the SS-25s currently deployed there. Preparations to deploy the first silo-based RS-24s have begun at Kozelsk division to replace SS-19s deployed there. It is not known how many RS-24s Russia plans to deploy, but it might eventually involve 120 to150 missiles.

The number of warheads carried on the RS-24 is uncertain. It is frequently rumored in the news media to carry up to 10, but with a throw-weight similar to the U.S. Minuteman III ICBM, the RS-24 is more likely to carry three or four warheads. Some U.S. officials privately say six warheads, but it is unclear if this is based on New START Treaty counts or because the RS-24 is similar to the SS-N-32 (Bulava) SLBM, which Russia has declared equipped with six warheads. It is also potentially possible – but unknown – that mobile RS-24s might carry fewer warheads than the silo-based version. This report estimates an average of three warheads per RS-24.

The Russian government has also announced plans to develop a new "heavy" ICBM, possibly as a replacement for some of the SS-18s. Rumors abound in the news media that the missile would carry up to 10 warheads. Preliminary plans call for deployment to begin in 2018, but delays are almost certain.

Ballistic Missile Submarines: Russia currently operates nine SSBNs with a total of 144 ballistic missiles. This includes six Delta IVs (all in the Northern Fleet) and three Delta IIIs (all in the Pacific Fleet). Production of the first three of eight new Borei-class SSBNs

is underway, a program scheduled to gradually replace the aging Delta fleet. At any given time, five to six of the SSBNs are operational with missiles on board, but only a few are deployed at sea on deterrent patrols under normal circumstances.

Six Delta IV-class SSBNs based in the Northern Fleet constitute the mainstay of Russia's SSBN force. Commissioned between 1984 and 1990, the subs have nearly completed a modernization program that refueled the nuclear reactors and installed the Sineva SLBM, a modified version of the SS-N-23 SLBM. Each Sineva can carry four warheads. Another modification of the SS-N-23, known as the Layner (or Lainer), is underway. The Layner apparently is a Sineva with an improved payload. Some say the Layner can carry 10 warheads, while others believe it continues to carry four but with additional decoys and penetration aids added to improve its ability to penetrate ballistic missile defense systems. The Delta IVs will probably be phased out on a one-for-one basis as the Borei-class SSBNs are commissioned.

Three Delta III-class SSBNs are based in the Pacific Fleet on the Kamchatka Peninsula. The aging boats, which were commissioned between 1979 and 1982, each carry 16 SS-N-18 Mod 1 SLBM, each with three warheads. The Delta IIIs will be replaced by the first three Borei-class SSBNs.

Three new Borei-class SSBNs are under construction at the Severodvinsk shipyard, each equipped with 16 SS-N-32 (Bulava) SLBMs. Each missile can carry six warheads. The first Borei-class SSBN will initially be based at the Northern Fleet but transition to the Pacific to replace the old Delta IIIs. The Borei and Bulava programs have been plagued with financial and technical difficulties. Construction of the first boat has taken more than 15 years and a third of the Bulava test flights have failed. Five more but improved Borei SSBNs, known as Borei-A, are planned to carry 20 missiles each. The eight-boat program apparently is scheduled for completion by 2020, but it seems more likely that production will slide through the mid-2020s.[25]

The plan to replace a fleet of nine 16-missile SSBNs, with each SLBM carrying three to four warheads, with a fleet of eight SSBNs each carrying 16 to 20 SLBMs with six warheads each, will increase the number of SLBMs and warheads on the Russian SSBN fleet over the next decade. How much depends on the rate of the Borei-class SSBN construction, how fast Delta IVs are phased out, and whether the fourth and subsequent Borei-class SSBNs will indeed be equipped with 20 missile tubes each instead of 16 tubes on each of the first three boats.[26] Considering these variables, this report cautiously estimates that the Russian SSBN force by 2022 might consist of nine SSBNs (six Borei and three Delta IV) with 156 missiles carrying roughly 840 (of which 120 SLBMs with 640 warheads might be deployed at any time) warheads – an increase of 12 missiles and 312 warheads.[27]

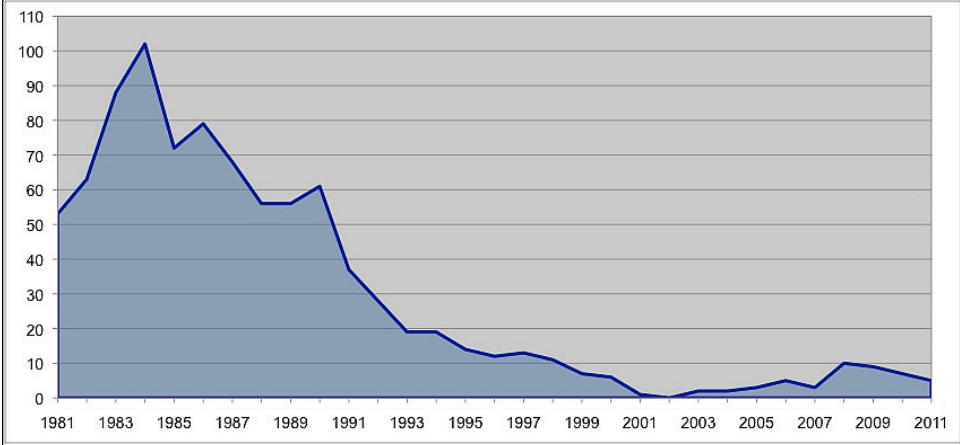
The expectation that the Russian SSBN fleet will be able to carry more warheads in 2022 than today, and therefore a greater share of Russia's strategic warheads, is surprising given Russia's general concern over U.S. and NATO conventional capabilities. SSBNs are potentially vulnerable to adversarial anti-submarine warfare capabilities and U.S. and British attack submarines are through to be surveying Russian SSBNs, although less so than during the Cold War.

The apparent growing importance of the SSBN leg in Russia's strategic nuclear triad is also noteworthy considering that Russian SSBN operations have declined significantly since the end of the Cold War, from 37 in 1991 to five in 2011 (see Figure 4). This means that each submarine spends far less time deployed than previously, and that each crew therefore receives less practical experience in operating the SSBN force effectively. For the past decade, the patrol rate has been too low to maintain a continuous at-sea SSBN presence. Former Russian defense minister Sergei Ivanov reportedly said in September 2006 that five SSBNs were on patrol.[28] But since five was the total number of SSBN patrols conducted the entire year, his assertion would have required five SSBNs to sail on patrol more or less at the same time, with no SSBNs on patrol the rest of 2006. Instead of a continuous at-sea deterrent, Russia appears to have sent SSBNs on patrol from time to time for training purposes.

The 2011 patrol rate of five patrols per year is too low to maintain a continuous at-sea presence for two fleets. It would require each patrol to last at least 73 days, which is thought to be longer than the average duration of Russian SSBN patrols. Six patrols, each with a duration of 60 days, could hypothetically provide a continuous at-sea deterrent, but only with one SSBN on patrol at any given time.

Heavy Bombers: Russian Strategic Aviation currently operates a fleet of approximately 76 nuclear long-range bombers based at two bases (Engels and Ukrainka). This includes an estimated 13 Tu-160 Blackjack and roughly 62 Tu-95MS Bear. All of the Blackjacks and about half of the Bears are being upgraded and are expected to remain in service until 2030. The heavy bombers are capable of delivery nuclear air-launched cruise missiles, including the AS-15A Kent (Kh-55) and AS-15B (Kh-55SM, which is an improved version of the AS-15A) or the short-range attack missile AS-16 Kickback (Kh-15).[29] Development of a new nuclear cruise missile known as the Kh-102 has been underway for a long time (the conventional version is known as Kh-101).

Figure 4:
Russian Ballistic Missile Submarine Patrols 1981-2011



The number of deterrent patrols conducted by Russian SSBNs each year has decline 86 percent since the end of the Cold War, from 37 to five. In 2002, no patrols were conducted at all. The current patrol rate is too low to maintain a continuous at-sea presence.

Development of a next-generation bomber, tentatively known as the PAK DA, is included in the 2020 State Armament Program for initial prototype deployment in 2015 and delivery in 2020. It is unlikely, however, that the bomber will be completed that soon.

Non-Strategic Nuclear Forces: The status of Russian non-strategic nuclear forces is unclear. The Russian government stated in 2005 that, "Russia has cut down its arsenals of non-strategic nuclear weapons fourfold,"[30] as a result of the presidential initiatives from 1991 and 1992. The U.S. Arms Control and Disarmament Agency (ACDA) estimated in late-1991 that the arsenal at that time included "over 13,000±" non-strategic nuclear weapons.[31] This suggests that the arsenal in 2005 included roughly 3,250 non-strategic warheads. Since then, reductions have continued and this report estimates that the total number of warheads available for Russian non-strategic nuclear forces has since declined to approximately 2,000 warheads.[32]

Like the United States and NATO, Russia does not provide information about the number and status of its non-strategic nuclear forces. Based on the 1991/1992 presidential nuclear initiatives and subsequent statements by Russian officials, however, this report estimates that the distribution of the roughly 2,000 non-strategic nuclear warheads is as follows: 730 warheads for tactical air forces; 700 warheads for naval forces; 400 warheads

for air, ballistic missile, and coastal defense forces; and 100 to 200 for short-range ground-launched ballistic missiles.

The biggest category is tactical air forces with an estimated 730 warheads for delivery by Tu-22M3 Backfire bombers and Su-24M Fencer fighter-bombers. The weapons include the dual-capable AS-4 Kitchen (Kh-22) and gravity bombs. An improved version of the AS-4, known as the Kh-32, might be under development for the future modified Backfire known as the Tu-22M5. The Su-34 Fullback is gradually replacing the Su-24M and probably taking over the nuclear strike role. The gravity bomb portion of this inventory, which might include roughly 430 bombs, is the only part of Russia's non-strategic nuclear arsenals that is directly comparable with the U.S. stockpile of approximately 500 B61 gravity bombs.

The second biggest category of 700 warheads is for naval forces. This includes land-attack sea-launched cruise missiles, anti-ship cruise missiles, anti-submarine rockets, air-defense missiles, torpedoes and depth bombs for delivery by nearly 190 nuclear-capable surface ships, submarines and maritime aircraft and helicopters. Some surface ships and submarines may be converting some of their nuclear missiles to more usable conventional weapons. A new class of nuclear-powered attack submarines, the Yasen or Severodvinsk class, is under construction that will have non-strategic nuclear weapons capability. Overall, the Navy sees non-strategic nuclear weapons as necessary to compensate against superior naval forces of the United States and NATO.

Defensive nuclear forces include three categories: air-, anti-missile- and coastal-defense forces. Combined, the three groups are thought to be assigned roughly 400 warheads. Most of the warheads are for S-300 air-defense system interceptors, about 68 for the A-135 anti-ballistic missile defense system around Moscow, and fewer than 20 for the SSC-1B coast defense system. It is unknown if the new S-400 air-defense system will also be nuclear-capable.

The 1991/1992 presidential initiatives declared that all ground-launched non-strategic nuclear weapons would be destroyed, but Russia is thought to have retained 100 to 200 warheads for the SS-21 (Tochka) short-range ballistic missile and its replacement, the SS-26 (Iskander).

Conclusions and Recommendations for Further Nuclear Reductions

The United States and Russia have reduced their nuclear forces dramatically since the end of the Cold War, but excessive inventories remain that are more than an order of magnitude larger than the arsenal of any other nuclear weapons state. Combined, the United States and Russia today maintain more than 9,000 nuclear warheads in their stockpiles for delivery by more than 2,000 ballistic missiles, aircraft, submarines, surface ships and defensive forces. Another 7,000 retired – but still intact – warheads are thought to be in storage awaiting dismantlement, for a total estimated combined inventory of roughly 16,000 warheads.

The New START Treaty places some limits on U.S. and Russian strategic force levels and includes an important updated verification regime, but analysis underpinning the treaty also protected the existing force structures and the overall force levels are largely unaffected. The Obama administration has stated its intent to also pursue reductions in non-deployed and non-strategic nuclear weapons.

Because neither the 2002 Moscow Treaty nor the New START Treaty included sub-limits on strategic forces, the U.S. and Russian postures have evolved in asymmetrical ways that are starting to pose challenges for future reductions. The U.S. posture has evolved toward high numbers of delivery vehicles, each with reduced warhead loadings, and with large numbers of warheads in storage for reconstitution. The Russian posture, in contrast, has, partly due to a declining industrial production capacity, evolved toward fewer delivery vehicles, each with maximum warhead loadings, and with comparatively few warheads in reserve.

Significant asymmetry drives force modernizations to compensate. Russia, for example, is trying to compensate by deploying new missiles with more warheads to keep up. And the United States is structuring its forces with a large "hedge" of stored warheads intended for re-loading onto missiles and bombers in response to technical and geopolitical surprise, including a Russian breakout scenario from the New START Treaty.

This growing asymmetry potentially creates stability issues because it enforces concerns in the minds of military planners that relatively few warheads on a larger ICBM force could destroy a lot of warheads on a smaller heavily MIRVed force. This is especially the case if the attacking ICBMs are on alert. Conversely, a smaller but heavily MIRVed missile force could potentially destroy a lot of targets very quickly. Such were considerations during the Cold War, but they should not be relevant in U.S.–Russian relations today.

The growing asymmetry could make further reductions more complicated because by making it harder to identify comparable cuts with comparable constraints and benefits. The effect is already apparent in non-strategic nuclear weapons where reducing disparity

of forces is now a precondition for further reductions. Many have proposed a "big pot" arms control approach for further reductions that would simply place an overall limit on total U.S. and Russian stockpiled warheads and allow each side to posture their forces below the limit largely as they see fit.[33] Such an approach can be attractive to broaden limitations to non-deployed and non-strategic warheads quickly, but without additional sub-limits, it could also increase the asymmetry of forces and stimulate new modernizations and complicate additional reductions.

To offset such effects, it is necessary to adjust the U.S. and Russian nuclear postures to reduce asymmetry. This does not mean that the forces have to be identical or that each side cannot plan according to its special conditions. And some of the adjustments can involve negotiated agreements while others can be unilateral steps that each side simply takes to ease the transition toward lower levels.

Some analysts reject unilateral reductions, but unilateral reductions can be important for several reasons. First, they can enable retirement of excess weapons and warheads that are no longer needed for national or international security without lengthy negotiations. Second, unilateral reductions can serve to stimulate reductions in other nuclear weapon states whose forces it would otherwise take lengthy negotiations to reduce via an arms control treaty. The U.S. unilateral presidential nuclear initiatives in the early 1990s, for example, were important catalysts for reciprocal Russian reductions.[34] Likewise, U.S. and Russian reductions triggered unilateral British and French nuclear reductions without treaty negotiations. Legislation or policy decisions that prohibit unilateral reductions of nuclear weapons, conversely, could result in nuclear forces levels that are higher than required for national or international security, thereby wasting scarce financial resources and potentially slowing or even undermining the nuclear arms reduction process.

The following recommendations are intended to propose nuclear arms reductions steps that can be taken unilaterally now and in the near future to reduce the asymmetry of U.S. and Russian nuclear postures and increase transparency to help pave the way for more drastic reductions via future arms control treaties.

Nuclear Guidance Review: The Obama Administration has nearly completed a strategic review that reportedly involves a reassessment of U.S. nuclear targeting requirements and alert levels to identify options for reducing nuclear forces further. While the study itself apparently is complete, President Obama will has to choose among a range of options and issue a new Presidential Policy Directive to the military for adjusting nuclear force planning. Part of the conclusions may form the basis of a new arms control treaty with Russia, but some decisions can probably be implemented unilaterally.[35]

Recommendation: The Obama administration should complete and publicly present the main conclusions of its strategic nuclear targeting review.

Recommendation: I addition to unilateral adjustments of the U.S. nuclear posture, the results of the strategic review should form the basis of a U.S. proposal to Russia for a follow-on START Treaty to reduce U.S. and Russian deployed strategic nuclear forces to 500 delivery vehicles and 1,000 warheads.

Ballistic Missile Submarines: Both the United States and Russia can make changes to their SSBN postures to reduce force levels and operations.

The United States plans to reduce the number of missile tubes on each SSBN from 24 to 20 in 2015-2016. Later in the decade, it might also retire two of the 14 SSBNs early. Each of the next-generation SSBN (SSBNX) will only have 16 tubes compared with 24 tubes on the each SSBN today. The decision to reduce the fleet of 14 SSBNs each with 24 SLBMs to 12 SSBNs each with 16 SLBMs – a reduction of 144 missiles or more than 40 percent, combined with the decline in deterrent patrols and operational tempo, raises questions about the size of the force and the need to continue to retain two full crews for each SSBN. The trend suggests that the SSBN posture for some time has been significantly in excess of national security needs at the unnecessary expense of taxpayer dollars, and that it is scheduled to remain too high for the next two decades.

Recommendation: Reduce the Ohio-class SSBN fleet to 12 boats and the number of missile tubes on each SSBN to 16 within the next few years, the force level that has already been decided for the SSBNX. This would also permit retirement of more than 700 warheads.

Recommendation: Within the next decade, reduce the number of Ohio-class SSBNs further to eight or ten to better match the Russian level.

Recommendation: Reduce the maximum capacity on each SLBM to four warheads. Eliminate the reconstitution hedge of reserve warheads.

The outlook for Russia's SSBN force is less clear but it appears to be heading toward eight submarines with 156 missiles by 2022. The replacement of Delta III and Delta IV SSBNs with the Borei SSBN will result in a slightly smaller SSBN force but with greater missile and warhead capacity. This increase is caused by the improved Borei SSBNs (fourth and subsequent hulls) being equipped with 20 missile tubes instead of the 16 on Delta SSBNs, and because the new Bulava SLBM carries six warheads instead of three and four on the SS-N-18 and SS-N-23 (Sineva) it replaces.

Recommendation: Curtail the number of missile tubes on improved Borei SSBNs to 16, the same as on existing Delta SSBNs.

Recommendation: Reduce the maximum capacity on each SS-N-23 (Sineva) and Bulava SLBM to four warheads. Eliminate the excess warheads.

Operations of SSBNs can also be curtailed and adjusted to better fit today's security environment. The U.S. SSBN fleet has continued a high tempo of operations with two crews to ensure uninterrupted deterrent patrols and four to five of its deployed SSBNs on alert. Russia has not been able to match this performance but has recently announced that it intends to resume continuous patrols.

Recommendation: Remove the requirement for prompt launch of SLBMs and reduce SSBN operations to focus on ensuring a secure retaliatory capability.

Recommendation: Reduce to one crew per SSBN.

Intercontinental Ballistic Missiles: The United States and Russia should take steps to better realign their highly asymmetrical ICBM forces.

The large U.S. ICBM force on high alert with a significant warhead upload capacity drives Russian worst-case planning and fear of vulnerability of its smaller but highly MIRVed ICBM force. Under current plans, the ratio of MIRVed missiles in the Russian ICBM force is expected to nearly double within the next decade. The START II treaty included an important agreement to ban multiple warheads on ICBMs. That ban should be revived and incorporated into the next treaty. To reduce the growing asymmetry in U.S. and Russian ICBM forces, and to pave the way for de-MIRVing, important steps can be taken. The U.S. ICBM force is already being downloaded to single-warhead loading, but the capability to reconstitute the offloaded warheads back onto the missiles should be eliminated, and the missile force reduced to better match the size of the smaller Russian ICBM force and allow Russia to de-MIRV its ICBM force as well.

Recommendation: The United States should eliminate MIRV capability from its Minuteman III ICBM force and retire the reconstitution hedge warheads.[36]

Recommendation: The United States should reduce the ICBM force to 300 Minuteman III missiles by reducing one squadron from each of its three ICBM bases. This initiative could be combined with a proposal to Russia to de-MIRV its ICBMs (see below).

Recommendation: Russia should declare how many ICBMs and of what types it plans to deploy when.

Recommendation: Russia should immediately reduce the warhead loading of mobile RS-24 ICBMs to one warhead, the same loading on the SS-25 it is replacing.

Recommendation: Russia should de-MIRV its ICBM force in coordination with the U.S. reducing its ICBM force to 300 missiles.

Recommendation: Russia should terminate plans to field a "heavy" ICBM.

Heavy Bombers: The United States is designing a next-generation bomber to replace the B-52Hs and B-1B, and later B-2s, beginning in the mid-2020s. A total of 80 to 100 aircraft is envisioned. Russia has plans to introduce a new bomber around 2020, but it seems more likely that the service life of existing bombers will be extended.

Recommendation: The United States should remove the capability from B-52H bombers to carry and deliver nuclear gravity bombs. This would permit retirement of several hundred warheads from the stockpile.

Recommendation: Russia and the United States should reduce the maximum ALCM capacity on each bomber to six missiles. The next arms control treaty should address actual loading capacity or, at the least, not provide such a large discount to bomber weapons (e.g., each bomber might count as three to four weapons instead of one).

Recommendation: Russia should limit its ALCM inventory to one type.

Recommendation: The United States should delay initial nuclear capability on its next-generation bomber to enable existing bombers to serve that role as long as possible.

Non-Strategic Nuclear Weapons: Short-range, or non-strategic, nuclear weapons are a leftover from the Cold War, where they were designed and fielded for use in regional battlefield-like scenarios.[37] Since 1991, the United States and Russia have drastically reduced their stockpiles of non-strategic nuclear warheads, but large inventories remain – a leftover that becomes more important as strategic forces are reduced. With the U.S.-Soviet nuclear standoff gone from Europe and elsewhere, non-strategic nuclear weapons should be reduced and, wherever possible, eliminated. NATO doctrine has already transitioned beyond non-strategic nuclear weapons by stating only that it is *strategic* nuclear forces that provide the ultimate security guarantee to the alliance.[38] The nearly 200 nuclear bombs the United States deploys in Europe are only there because NATO has not yet been able to figure out how to withdraw them due to assurance requirements, particularly of some allies in Eastern Europe. In Northeast Asia, where all U.S. non-strategic weapons were withdrawn in 1991, some Japanese and South Korean officials apparently still have a hard time accepting that fact.

NATO's newfound concern about the disparity with Russia's larger inventory of non-strategic nuclear weapons is misguided, first because NATO hasn't cared much about the disparity for the past two decades, and second because the Alliance unilaterally has

eliminated all other categories than air-delivered bombs and even cut the remaining bombs in Europe by more than half since 2004. Indeed, at the same time that NATO begun to express concern over the disparity of U.S. and Russian non-strategic nuclear forces, the U.S. has unilaterally (with NATO's blessing) retired its last non-strategic naval nuclear weapon, thus further *increasing* the disparity. Moreover, the size and composition of Russia's non-strategic nuclear forces are not determined by U.S. non-strategic nuclear forces but by the Russian military's conviction that non-strategic nuclear weapons are needed to compensate for Russia's inferior conventional capability against U.S. and NATO superior conventional forces. Instead, the continued presence of U.S. non-strategic nuclear weapons in Europe has become a convenient excuse for Russian officials to reject talks about reducing non-strategic nuclear weapons in general.

To break this stalemate, the United States needs to work to convince NATO to withdraw the remaining U.S. nuclear weapons from Europe. Importantly, there are indications that the new French government is considering changing the previous government's opposition to a withdrawal of U.S. nuclear weapons from Europe.[39] Continued assurance of NATO allies with non-nuclear means should be done in a way that doesn't deepen Russian concern over NATO's conventional capabilities – and thus reinforces a Russian need for non-strategic nuclear weapons to compensate.

Both sides need to significantly decrease secrecy and increase transparency of their non-strategic nuclear forces. Excessive secrecy fuels rumors and worst-case assumptions that block or complicate arms control efforts. Transparency, on the other hand, defuses suspicion and improves the ability to develop the best options to reduce non-strategic nuclear weapons.

> *Recommendation:* The United States and Russia should announce the size and history of their non-strategic nuclear warhead stockpiles.
>
> *Recommendation:* The United States and Russia should increase transparency of their non-strategic nuclear forces, starting by disclosing the sites where they are no longer deployed, jointly developing inspections for verifying the absence of the weapons, and following up by declaring where the remaining nuclear weapons are stored.
>
> *Recommendation:* The United States and Russia should develop a framework for reducing and eventually eliminating non-strategic nuclear forces. The framework should include a combination of unilateral and negotiated steps and a verification regime for verifying the status and reductions of non-strategic nuclear forces.

Recommendation: As a good-will gesture in response to the U.S. retirement of the TLAM/N, Russia should retire its nuclear land-attack sea-launched cruise missiles.

Recommendation: Russia should eliminate the remaining nuclear capability for ground-launched forces, as promised by the presidential nuclear initiatives in 1991/1992.

Recommendation: The United States should declare its intension to withdraw its nuclear weapons from Europe, and work with its NATO allies toward that goal.

Recommendation: The United States should, in consultation with its allies, cancel the B61-12 life-extension program and instead perform a bare-bone life-extension of the B61-7 for the B-2 bomber.

Nuclear Stockpile and Production Complex: The United States has disclosed the size and history of its nuclear weapons stockpile, and Russia needs to follow this example (Britain and France have also disclosed the size of their stockpiles). Both countries should also disclose the history and annual dismantlement of retired warheads to remove concerns about cheating and to demonstrate to the international community their sincerity about reducing and destroying nuclear weapons. To that end, the growing disparity of deployed and non-deployed ballistic missile warheads is a particular concern, with the United States maintaining a significant inventory of reserve warheads while Russia has no or only a limited upload capability, because it fuels Russian suspicion that the United States cannot be trusted and is retaining a capacity to break out of arms control agreements.

Over the course of two decades, the United States has invested billions of dollars in a modern stockpile stewardship program that enables it to verify, refurbish and re-certify existing nuclear warhead types without producing new ones. Not much is known about the Russian warhead program but it is assumed to rely much more on reproduction of existing warhead types and production of new ones. Limiting warhead production capacity in both countries is important to making arms reductions irreversible and reducing concerns about treaty breakout scenarios. The United States is already collaborating with Britain and France on their stockpile stewardship programs, and it should explore how it could collaborate with Russia to help reduce its warhead production capacity while continuing to verify the reliability of existing warheads.

Recommendation: Russia should announce the total size and history of its nuclear weapons stockpile.

Recommendation: The United States and Russia should announce the size and history of their annual nuclear warhead dismantlements.

Recommendation: Russia should curtail production of nuclear warheads to one of its two remaining plants.

Recommendation: The United States should eliminate its hedge of reserve warheads intended to increase (reconstitute) the warhead loading on ballistic missiles.

Recommendation: The United States should cancel the Chemistry and Metallurgy Research Replacement Nuclear Facility (CMRR-NF) and Uranium Production Facility (UPF) and instead upgrade existing facilities to meet low-rate refurbishment of warheads.

Recommendation: The United States and Russia should explore options for designing an improved Russian nuclear weapons stockpile stewardship program that can maintain the reliability of existing warheads but reduce a need to produce new warheads.

ENDNOTES

[1] In addition to these stockpile warheads, the United States stores an estimated 3,000 retired – but still intact – warheads in line for dismantlement. Russia has an estimated 4,000 warheads awaiting dismantlement.

[2] For a breakdown of world nuclear forces, see: Hans M. Kristensen and Robert S. Norris, *Status of World Nuclear Forces 2012*, May 7, 2012, http://www.fas.org/programs/ssp/nukes/nuclearweapons/nukestatus.html

[3] For official U.S. government documents relating to the New START Treaty, see: U.S. State Department, New START, http://www.state.gov/t/avc/newstart/index.htm

For analysis of the September 2012 New START Treaty aggregate data, see: Hans M. Kristensen, New Detailed Data For US Nuclear Forces Counted Under the New START Treaty, *FAS Strategic Security Blog*, November 30, 2012, http://www.fas.org/blog/ssp/2012/11/newstart2012-2.php

[4] The White House, Office of the Press Secretary, *Remarks by President Barack Obama, Hradcany Square, Prague, Czech Republic*, April 5, 2009.

[5] "Russia Cites Nuke-Curb Dialogue Considerations," Global Security Newswire, November 9, 2012,

[6] "Moscow insists on making nuclear arms reduction multilateral – DFM Sergei Ryabkov," *ITAR-TASS*, November 8, 2012, http://www.itar-tass.com/en/c154/566484.html

[7] U.S. Department of Defense, Office of the Secretary of Defense, *Report on the Strategic Nuclear Forces of the Russian Federation Pursuant to Section 1240 of the National Defense Authorization Act for Fiscal Year 2012*, May 1, 2012, pp. 6, 7. Partially declassified and released under FOIA. A copy of the document is available here: http://www.fas.org/blog/ssp/2012/10/strategicstability.php

[8] For additional information on the status of the U.S. nuclear posture, see: Hans M. Kristensen and Robert S. Norris, "U.S. nuclear forces, 2012," Nuclear Notebook, *Bulletin of the Atomic Scientists*, May/June 2012, pp. 84-91, http://bos.sagepub.com/cgi/reprint/68/3/84

[9] For a description of the review and nuclear guidance, see: Hans M. Kristensen and Robert S. Norris, Reviewing Nuclear Guidance: Putting Obama's Words Into Action, *Arms Control Today*, November 2011, http://www.tinyurl.com/7x3oamq

[10] For an unclassified overview of the SSBNX program, see: William J. Brougham, Captain, U.S. Navy, *Ohio Replacement Program: Presented to the 2012 Navy Submarine League*, October 18, 2012, http://news.usni.org/news-analysis/documents/ohio-replacement-program

[11] For an overview of the SSBN replacement program, see: Ronald O'Rourke, *Navy Ohio Replacement (SSBN[X]) Ballistic Missile Submarine Program: Background and Issues for Congress*, U.S. Congressional Research Service, October 18, 2012.

[12] "Keeping Trident Ever Ready," *Explorations*, Draper Laboratory, Spring 2006, p. 8.

[13] "Underwater Wonder, Submarines: A Powerful Deterrent," *Warfighter Solutions*, Naval Surface Warfare Center Crane Division, Fall 2008, p. 14.

[14] U.S. Department of Energy, National Nuclear Security Administration, *FY 2012 Stockpile Stewardship and Management Plan*, April 15, 2011, p. 14. The report is available here: http://www.fas.org/programs/ssp/nukes/nuclearweapons/SSMP-FY2012.pdf

[15] The New START Treaty counted 141 nuclear bombers as of September 1, 2012, an anomaly caused by counting so-called phantom bombers that are no longer nuclear tasked but still carry some equipment that makes them accountable under the treaty.

[16] For an overview of U.S. nuclear weapons in Europe, see: Hans M. Kristensen and Robert S. Norris, "U.S. tactical nuclear weapons in Europe, 2011," Nuclear Notebook, *Bulletin of the Atomic Scientists*, January/February 2011, pp. 64-73, http://bos.sagepub.com/cgi/reprint/67/1/64

[17] Under the START I Treaty, which expired in December 2009, detailed categories of aggregate data for Russian forces were released by the U.S. State Department upon request. For a copy of the final such document (Memorandum of Understanding) from July 2009, see: http://www.fas.org/programs/ssp/nukes/armscontrol/MOU-Jul2009ex.pdf

The New START Treaty permits each Party to the treaty to release detailed categories of aggregate data for its own forces. But new secrecy laws adopted by the Russian Parliament meant that Russia officials insisted during the treaty negotiations that release of Russian data would require permission from Moscow. As a result, Russia now only publishes three overall numbers of aggregate data: deployed delivery vehicles; warheads attributed to deployed delivery vehicles; and total deployed and non-deployed delivery vehicles. Curiously, the Russian government shares the detailed breakdown of its forces with the Pentagon, but not with the public.

[18] Permanent Mission of the Russian Federation to the United Nations, *Statement by H.E. Mr. Sergey I. Kislyak, Deputy Minister of Foreign Affairs of the Russian Federation, at the Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons*, May 3, 2005, p. 3.

[19] *Joint Statement for the Record, The Honorable Madelyn Creedon, Assistant Secretary of Defense for Global Strategic Affairs, and The Honorable Andrew Weber, Assistant Secretary of Defense for Nuclear, Chemical, and Biological Defense Programs, On Fiscal Year 2013 National Defense Authorization Budget Request for Department of Defense Nuclear Forces Programs*, Before the Strategic Forces Subcommittee Committee on Armed Services, U.S. Senate, March 28, 2012, p. 3, http://www.senate.gov/~armed_services/statemnt/2012/03%20March/Creedon-Weber%2003-28-12.pdf

[20] In addition to the stockpiled warheads available for military use, an estimated 4,000 retired – but still intact – warheads are awaiting dismantlement. The annual rate of dismantlement is not known, however, so the number comes with considerable uncertainty.

[21] For additional information on the status of the Russian nuclear posture, see: Hans M. Kristensen and Robert S. Norris, "Russian nuclear forces, 2012," Nuclear Notebook, *Bulletin of the Atomic Scientists*, March/April 2012, pp. 87-97, http://bos.sagepub.com/cgi/reprint/68/2/87; See also Pavel Podvig's excellent web site *Russian Strategic Nuclear Forces* (http://russianforces.org/).

For a more in-depth estimate of Russian non-strategic nuclear forces, see: Hans M. Kristensen, *Non-Strategic Nuclear Weapons*, Federation of American Scientists, May 2012, http://www.fas.org/_docs/Non_Strategic_Nuclear_Weapons.pdf

Note that a recent study estimates that the number of Russian "operationally assigned" non-strategic nuclear weapons warheads may be even smaller, perhaps as low as 1,000. Even so, the study estimates the total inventory may include some 1,900 non-strategic warheads. See: Igor Sutyagin, *Atomic Accounting: A New Estimate of Russia's Non-Strategic Nuclear Forces*, Royal United Services Institute, Occasional Paper, November 2012, p. 3. http://www.rusi.org/downloads/assets/1211_OP_Atomic_Accounting_Web.pdf

[22] U.S. Department of State, *New START Treaty Aggregate Numbers of Strategic Offensive Arms*, Fact Sheet, October 3, 2012, http://www.state.gov/t/avc/rls/201216.htm

[23] Mikhail Fomichev, "Russia Planning To Spend More Than 100 Billion Rubles on Nuclear Arms by the Year 2015," *RIA Novosti*, November 4, 2012, Open Source Center via World News Connection.

[24] "'Булава' к концу года: Минобороны обнародовало оружейные приоритеты," *Rossiyskaya Gazeta*, February 25, 2011, ***http://www.rg.ru/2011/02/24/pole-site.html***

[25] There are rumors that design work has begun under the 2020 State Armament Program on a fifth-generation submarine hull that could form the basis for both ballistic missile submarines and attack submarines. This does not imply, apparently, that each both would carry both ballistic and cruise missiles, but that the hull could be used for either SSBNs or SSGNs. "Hull of 5-gen sub to be unified for cruise and ballistic missiles," *rusnavy.com* (RIA Novosti), March 21, 2012, http://rusnavy.com/news/navy/index.php?ELEMENT_ID=11789

[26] For reports on the 20 missile tubes, see: "Количество шахтных пусковых установок на АПЛ проекта "Борей" будет увеличено до 20 с четвертого корабля," *flotprom.ru* (ITAR-TASS), November 3, 2012; "Russia to start building the first project 955A sub, while design work continues," Interfax-AVN Online, July 25, 2012. Open Source Center via World News Connection.

[27] Note that due to maintenance and overhaul, fewer SLBMs and warheads will be deployed at any given time, perhaps only 120 SLBMs with approximately 624 warheads.

[28] Nabi Abdullaev, "Russia Delays Joint Exercise, Tests ICBMs," *Defense News*, September 18, 2006, p. 4; "Russian Defense Minister Reports Successful ICBM Test-Launch," *mosnews.com*, September 11, 2006.

[29] There are rumors that the AS-16 may have been retired from the bomber force.

[30] Permanent Mission of the Russian Federation to the United Nations, *Statement by H.E. Mr. Sergey I. Kislyak, Deputy Minister of Foreign Affairs of the Russian Federation, at the Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons*, May 3, 2005, p. 3.

[31] U.S. Arms Control and Disarmament Agency, "Reponses by the Arms Control and Disarmament Agency to Additional Questions Submitted by the Subcommittee," in *Recent United States and Soviet Arms Control Proposals*, Subcommittee on Arms Control, International Security and Science, and on Europe and the Middle East, House Foreign Affairs Committee, November 5, 1991, p. 68.

[32] For additional information about Russia's non-strategic nuclear forces, see: Hans M. Kristensen, *Non-Strategic Nuclear Weapons*, Federation of American Scientists, May 2012, http://www.fas.org/_docs/Non_Strategic_Nuclear_Weapons.pdf

Note that a recent study estimates that the number of Russian "operationally assigned" non-strategic nuclear weapons warheads may be even smaller, perhaps as low as 1,000. Even so, the study estimates the total inventory may include some 1,900 non-strategic warheads. See: Igor Sutyagin, *Atomic Accounting: A New Estimate of Russia's Non-Strategic Nuclear Forces*, Royal United Services Institute, Occasional Paper, November 2012, p. 3. http://www.rusi.org/downloads/assets/1211_OP_Atomic_Accounting_Web.pdf

[33] For an insightful overview of nuclear arms control issues and potential measures to reduce nuclear forces, see: Steven Pifer and Michael E. O'Hanlon, *The Opportunity: Next Steps in Reducing Nuclear Arms* (Washington, D.C.: Brookings Institution Press, 2012).

[34] For an excellent review of the U.S. presidential nuclear initiatives, see: Susan J. Koch, *The Presidential Nuclear Initiatives of 1991-1992*, National Defense University, September 2012.

[35] For a description of the review process, see: Hans M. Kristensen and Robert S. Norris, "Reviewing Nuclear Guidance: Putting Obama's Words Into Action," *Arms Control Today*, November 2011, http://tinyurl.com/7x3oamq

[36] The 2010 Nuclear Posture Review determined that the ICBM force should be "de-MIRVed." In reality, only a few missiles still have multiple warheads. Moreover, those missiles will be *downloaded*, but retain the ability to reload multiple warheads if needed.

[37] For additional information about U.S. and Russian non-strategic nuclear forces, see: Hans M. Kristensen, *Non-Strategic Nuclear Weapons*, Federation of American Scientists, May 2012, http://www.fas.org/_docs/Non_Strategic_Nuclear_Weapons.pdf

[38] North Atlantic Treaty Organization, *Deterrence and Defense Posture Review*, May 20, 2012, Paragraph 9, http://www.nato.int/cps/en/SID-193D7980-4A881D9C/natolive/official_texts_87597.htm; North Atlantic Treaty Organization, *Active Engagement, Modern Defense, Strategic Concept for the Defense and Security of the Members of the North Atlantic Treaty Organization*, adopted by the Heads of States and Government in Lisbon, November 19, 2010, Paragraph 18, http://www.nato.int/lisbon2010/strategic-concept-2010-eng.pdf

[39] A recent recommendation for the new French government not to oppose U.S. withdrawal of non-strategic nuclear weapons from Europe appears in the report: Hubert Vedrine, Rapport Pour le President de la Republique Francaise sur les Consequences du Retour de la France Dans le Commandement Integre de L'Otan, sur La'Avenier de la Relation Transatlantique et les Prespectives de L'Europe de la Defense, November 14, 2012, p. 20. See, Jean-Marie Collin, "Flash – Hubert Védrine : La France, l'OTAN et les B61... le commencement!," *alternatives-economiques.fr*, http://tinyurl.com/azm7aqx

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