Foreign Policy
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THE NEXT ROUND:

The United States and Nuclear Arms Reductions After New START

Steven Pifer

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1. Introduction and Summary

Issues for the Next Negotiation

Presidents Barack Obama and Dmitry Medvedev signed the New Strategic Arms Reduction Treaty (New START) on April 8, 2010. If the treaty is ratified and enters into force, U.S. and Russian strategic forces will be constrained at levels significantly below those contained in the 1991 START I Treaty.

New START provides that the sides may deploy no more than 1,550 strategic warheads, no more than 700 deployed intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missiles (SLBMs) and heavy bombers equipped for nuclear armaments, and no more than 800 deployed and non-deployed ICBM and SLBM launchers plus nuclear-capable heavy bombers. The treaty contains a set of verification measures that should give the sides confidence in their ability to detect militarily significant violations in a timely manner.

New START offers significant security benefits for the United States. The treaty's implementation will limit the strategic nuclear forces of Russia; restore a verification regime that will yield greater transparency regarding—and important insights into—Russian strategic forces, thereby allowing U.S. commanders to make smarter decisions about how they equip and operate U.S. strategic forces; permit the United States to maintain a robust and survivable nuclear deterrent; strengthen the U.S. hand in pressing for a strong non-proliferation regime; and boost the broader U.S.-Russian relationship.[1]

The Obama administration envisages New START as the first step in a continuing process of reducing nuclear weapons. It believes that an ongoing process of U.S.-Russian arms reductions, ultimately expanded to include other nuclear powers, is essential to bolster the nuclear non-proliferation regime, at a time when use of a nuclear weapon by an outlier state or terrorist group is seen as the greatest nuclear threat. Although it is not clear how enthusiastic the Russians are about further reductions, President Medvedev has agreed in principle to work toward further cuts. If New START is ratified and enters into force, the question will then be: what happens in the next round of U.S.-Russian negotiations? This paper examines the issues that will likely arise. They include:

Deployed Strategic Warhead and Strategic Delivery Vehicle Limits. The first question is whether Washington and Moscow will wish to reduce the limits on strategic warheads, strategic delivery vehicles and launchers below those in New START. Reports in early 2009 suggested that some in the Obama administration were interested in reducing deployed strategic warheads to 1,000 on each side. If the sides decide to lower the limit on deployed strategic warheads, they would undoubtedly consider whether there should be commensurate reductions in the limits on strategic delivery vehicles and launchers.

Non-Strategic Nuclear Warhead Limit. A second question involves non-strategic (sometimes referred to as tactical or substrategic) nuclear warheads. The Obama administration is on record that it will seek limits on tactical nuclear weapons in the next negotiation.[2] This will pose several difficult issues. The Russians hold a substantial numerical advantage and rely on tactical nuclear weapons to offset perceived

conventional imbalances vis-à-vis NATO to the west and China to the east. The Russians, moreover, could insist that tactical nuclear weapons be deployed only on national territory as part of any agreement, which would require removal of the small number of U.S. tactical nuclear weapons currently based on European soil.

Non-Deployed Strategic Nuclear Warhead Limit. A third question involves non-deployed strategic nuclear warheads. New START requires the sides to reduce deployed strategic warheads but does not require that warheads actually be eliminated. Many, at least initially, will simply be maintained at storage sites. The possibility that such warheads could be returned to the deployed force creates a potential for breakout from the treaty, that is, for a side to rapidly expand its forces beyond the treaty limits. The Obama administration has said it would address non-deployed strategic nuclear warheads in the next round of negotiations.

Single Limit on All Nuclear Warheads? If the sides agree to bring non-strategic nuclear warheads and non-deployed strategic warheads into the negotiation, they will for the first time be discussing limits on their entire nuclear arsenals (except for those warheads that have been retired and are in the dismantlement queue). A fourth question thus is whether the sides would want to agree to a single limit covering all nuclear warheads—providing freedom to mix strategic and non-strategic, deployed and non-deployed—perhaps with one or two sublimits, e.g., a sublimit on deployed strategic warheads.

Long-Range, Conventionally-Armed Precision-Guided Weapons. The Russians are increasingly concerned that U.S. long-range, conventionally-armed precision-guided weapons can threaten their strategic forces and command and control. They will be interested in U.S. development of a hypersonic glide vehicle, which U.S. officials say would not be limited by New START. Other current conventional weapons appear to pose less of a threat to strategic forces, but there may still be value in a discussion—apart from a formal negotiation—of the implications of those systems for strategic stability.

Verification Issues. The verification regime for a new treaty would presumably build on the monitoring measures in New START. If the new treaty limits non-strategic nuclear warheads and/or non-deployed strategic warheads, the sides will have to explore verification measures that will be substantially more intrusive than those contained in nuclear arms reductions agreements thus far.

Third-Country Nuclear Forces. Another question will be third-country nuclear forces, particularly the strategic and intermediate-range nuclear forces of Britain, France and China. At some point in the nuclear arms reductions process, either Washington and/or Moscow will be unready to reduce further without addressing the nuclear forces of those countries. U.S. government officials hope that they can conduct one more round of purely U.S.-Russian negotiations and limitations. The ability to keep third-country nuclear forces off the agenda will affect—and be affected by—the depth and scope of the reductions proposed for U.S. and Russian nuclear forces.

Missile Defense. Missile defense will undoubtedly arise in the next round. The Russians agreed to a New START Treaty that does not impose meaningful limits on U.S. missile defense programs. The Russians, however, made a unilateral statement when signing the treaty suggesting that, were U.S. missile defense developments to threaten their strategic nuclear forces, Moscow would consider exercising its right to withdraw from the agreement. The Russians can be expected to return to the missile defense issue in a follow-on negotiation and may be more insistent on some kind of limitation. The Obama administration will resist such limits, if for no other reason than that any meaningful constraints on missile defense in the next strategic arms treaty would almost certainly make that agreement unratifiable in the U.S. Senate.

Taken together, these issues mean that the negotiation of a successor to the New START Treaty will get into questions more difficult than those that U.S. and Russian negotiators grappled with in 2009-2010. The pace of the negotiations, moreover,

may be affected by outside issues. For example, the Russian approach to tactical nuclear weapons could be affected by the fate of the Conventional Armed Forces in Europe (CFE) Treaty regime.

Preparing for the Next Round

The next round of formal U.S.-Russian negotiations will not begin until New START has been ratified by both sides and enters into force, probably not until sometime in 2011. Washington and Moscow might, however, conduct early consultations with a view to preparing the way for those negotiations. The sides could, for example, discuss their respective concepts of deterrence and strategic stability—including the interrelationship between strategic offense and missile defense and the impact of long-range conventionally-armed precision-guided weapons—with the goals of promoting transparency and exploring where their views converge and the implications of their views for future arms reductions.

Given the possibility that non-strategic and non-deployed strategic nuclear warheads may be added to the negotiating agenda, the sides might discuss developing a common method of categorizing nuclear weapons. The sides might also disclose to one another the total number of nuclear weapons in their nuclear arsenals, perhaps broken down into several basic categories. This would allow the sides to assess numbers against their own intelligence holdings, which might increase their confidence in the numbers declared subsequently in a formal data exchange.

Washington and Moscow might begin discussing concepts for monitoring data and verifying compliance with limits on non-deployed strategic nuclear warheads and non-strategic nuclear warheads, which will entail more intrusive verification requirements than those on deployed strategic warheads. Early consultations on these issues might speed up the formal negotiating process, once it begins.

Finally, U.S. and Russian officials might discuss what would be the threshold below which they would not be prepared to reduce their deployed strategic warheads (and other types of nuclear weapons) without addressing third-country nuclear forces.

Elements of a U.S. Position

When U.S. and Russian negotiators again sit down for formal talks, the U.S. goal should be one more round of purely U.S.-Russian arms reductions. It is unlikely that between now and the beginning of the next round of formal negotiations the United States will adopt a radical shift in nuclear doctrine and posture, especially as it just completed the Nuclear Posture Review in April 2010. Other considerations affecting the U.S. negotiating position will be the desire to address U.S. and Russian nuclear arms only and to produce an agreement that could be ratified by the U.S. Senate. These considerations suggest a more incremental approach than some in the arms control community might like to see.

U.S. negotiators should seek a limit on all strategic and non-strategic nuclear warheads, except for those retired and in the queue for dismantlement, of no more than 2,500 per side and a sublimit of no more than 1,000 deployed strategic warheads per side.[3] The warhead limit and sublimit would allow each side the freedom to choose between non-strategic nuclear weapons and non-deployed strategic warheads; Russia might retain more of the former, while the United States would likely prefer more of the latter.

As for strategic delivery vehicles, U.S. officials might propose to keep the limits at New START levels—700 deployed ICBMs, SLBMs and heavy bombers equipped for nuclear armaments, and 800 deployed and non-deployed ICBM and SLBM launchers and heavy bombers equipped for nuclear armaments. They should be ready, however, to consider accepting lower limits, for example, 600 deployed strategic delivery vehicles and 700 deployed and non-deployed launchers, depending on Russian agreement to other elements of the U.S. position.

A new agreement should apply the same counting rules as in New START for counting strategic warheads on strategic ballistic missiles, deployed strategic

delivery vehicles and deployed and non-deployed strategic launchers. Washington should consider proposing a change in the bomber weapon counting rule; while some discount for bomber weapons compared to strategic ballistic missile warheads is justified, U.S. officials might propose attributing each bomber with three-four weapons rather than one.

As for non-strategic and non-deployed strategic warheads, they would be counted on an actual count basis. Each side would declare to the other the number of weapons at each declared nuclear weapons storage site, including the number in each bunker, bay or chamber at the site, and those sites would be subject to inspection. The monitoring regime for tactical and non-deployed strategic warheads would be considerably weaker than that for deployed strategic warheads, and the sides would have to enter the agreement understanding that.

An agreement along the lines described above would build on New START. While the reduction in deployed strategic warheads—from 1,550 to 1,000—might not be as dramatic as some would like, that would be compensated for by the fact that the United States and Russia would each be limited to no more than 2,500 total nuclear warheads. This would set the stage for a further round, which would most likely have to involve third-country nuclear forces.

It should be noted that the next negotiation will be a far more complex and protracted affair than the negotiation that produced New START, given issues such as non-strategic nuclear warheads. Rather than taking eleven months, the time it took to finish New START, the next negotiating round will require several years and a fair amount of high-level intervention to break logjams in order to complete a new treaty.

2. New START and the Status of Strategic Forces

The Return to Traditional Nuclear Arms Control

President Obama took office in January 2009, and Vice President Joe Biden shortly thereafter announced a policy aimed at "resetting" U.S.-Russian relations, which in August 2008 had fallen to their lowest point in nearly 20 years. A major element of the "reset" was to reinvigorate the bilateral nuclear arms reduction dialogue.

An early issue for the new administration was negotiating a successor to the 1991 START I Treaty. START I limited the United States and Russia each to no more than 1,600 strategic nuclear delivery vehicles—ICBM launchers, SLBM launchers and heavy bombers—carrying no more than 6,000 nuclear warheads. START I contained detailed counting rules and verification provisions. The treaty, by its terms, was due to expire in December 2009. The George W. Bush administration negotiated the Strategic Offensive Reductions Treaty (SORT), signed by President Bush and President Vladimir Putin in 2002. It limited the United States and Russia each to no more than 1,700-2,200 operationally deployed strategic nuclear warheads. In contrast to START I, SORT had no agreed definitions, counting rules or verification provisions. The Bush administration proposed to replace START I with a legally binding treaty that would preserve a portion of the START I verification regime and would limit deployed strategic warheads. The Russians, however, rejected that approach, arguing that limits on strategic nuclear delivery vehicles had to be included and seeking to maintain more of START I's provisions. The sides were unable to reach agreement before the Bush administration's term ended.

Meeting in London on April 1, 2009, Presidents Obama and Medvedev agreed to begin negotiations on strategic offensive forces. In their joint statement on the broad U.S.-Russia relationship, the presidents "agreed to pursue new and verifiable reductions in our strategic offensive arsenals in a step-by-step process."[4] Four days later in Prague, President Obama stressed the importance of reducing the number and role of nuclear weapons, and embraced the goal of a nuclear weapons-free world. He made clear that many things would have to happen in order to eliminate nuclear weapons and affirmed that, until such time, maintaining an effective and reliable nuclear deterrent would remain crucial for U.S. security interests.[5]

Negotiations on a successor to START I began later in April. In July, the presidents agreed to a joint understanding that laid out the basic parameters for the new treaty, though at that point the sides found themselves quite far apart on some issues.[6] For example, the Russians proposed a limit of 500 on strategic delivery vehicles—ICBMs, SLBMs and heavy bombers equipped for nuclear armaments—while the U.S. proposal was for 1,100. Negotiations in the fall began to narrow these gaps as well as address verification questions. The sides missed the December 5, 2009 START 1 expiration deadline but continued to work. They resolved the last major issues in early 2010, including the numerical limits, enabling the treaty's signing.

New START's Limits

The New START Treaty imposes three numerical limits on U.S. and Russian strategic nuclear forces, so that, seven years after entry into force, each side will not exceed:

- 700 deployed ICBMs, SLBMs and heavy bombers equipped for nuclear armaments;[7]
- 1,550 warheads on deployed ICBMs and SLBMs and counted for heavy bombers equipped for nuclear armaments;[8] and
- 800 deployed and non-deployed ICBM and SLBM launchers, and deployed and non-deployed heavy bombers equipped for nuclear armaments.[9]

These limits are not strictly comparable to the 1991 START I Treaty limits of no more than 1,600 strategic nuclear delivery vehicles capable of carrying no more than 6,000 warheads. The counting rules are not identical. For example, START I used a type attribution rule that attributed a number of warheads to each ICBM and SLBM type, whereas New START counts the actual number of warheads on each strategic ballistic missile. On a similar note, START I had a type attribution rule for bomber weapons that discounted the number so that heavy bombers were attributed with fewer weapons than they could actually carry; bombers equipped to carry air-launched cruise missiles (ALCMs) counted as either eight warheads (Soviet or Russian bombers) or ten warheads (U.S. bombers) under the 6,000 limit, while those not equipped for ALCMs counted as one warhead.[10] New START attributes each nuclear-capable heavy bomber as carrying one warhead under the 1,550 limit, regardless of its capacity or operational load.

START I also had a series of nested sublimits, which the New START Treaty does not replicate. START I's sublimits were designed to encourage the sides to move away from large ICBMs with multiple independently targetable reentry vehicles (MIRVs). In the negotiation for the New START Treaty, Washington and Moscow avoided sublimits to maintain maximum flexibility to choose their mix of forces as they downsize to meet the treaty's limits.[11] This leaves open the possibility, if not the probability, that U.S. and Russian strategic force structures will develop in different directions—with the United States "downloading" missiles by removing warheads so that the missiles carry a fewer number of warheads than their capacity, while Russia maintains a smaller number of more heavily MIRVed missiles. (These trends were well underway prior to the negotiation of New START, in particular due to the limited resources that Moscow devoted to purchasing new ballistic missiles to replace those retired under START I.)

Compared to START I, New START expands the sides' ability to convert strategic systems to conventional-only roles and provides that such systems will not be captured under the treaty's limits. For example, the U.S. Navy has converted four Trident ballistic missile submarines so that they no longer carry SLBMs but instead carry canisters with conventional sea-launched cruise missiles (SLCMs), and the U.S. Air Force is now converting all of its B-1 heavy bombers to conventional-only roles. The missile tubes on the four converted Trident submarines and the converted bombers will not fall under the 700 or 800 limits. New START does, however, capture one type of conventional weapon: were either side to deploy conventional warheads on its ICBMs or SLBMs, those warheads—like nuclear warheads—would be counted under the 1,550 warhead limit.[12]

The New START warhead limit of 1,550 compares roughly to the 2002 Strategic Offensive Reductions Treaty limit of 1,700-2,200 strategic nuclear warheads. However, these limits also are not strictly comparable. Unlike New START, SORT contained no agreed definitions or counting rules; it is not clear that the United States and Russia shared the same approach to counting weapons under SORT, and the lack of definitions, counting rules and verification measures meant that compliance with SORT's limit could not be confirmed.[13]

New START incorporates a range of verification measures in addition to reliance on national

technical means of verification, such as imagery satellites. The treaty requires that the sides exchange large amounts of data—including, for example, the location of each deployed ICBM, SLBM and heavy bomber. They must update this information every six months. The treaty also requires that each ICBM, SLBM and heavy bomber have a unique identifier. In addition to the data exchange and updates, the treaty requires various notifications, e.g., the sides must give notice 48 hours in advance of the exit of a solid-fueled ICBM or solid-fueled SLBM from its production facility. Notifications will allow a side to "cue" its national technical means to monitor the other's strategic force developments.

New START provides that each side may conduct 18 on-site inspections per year of the other's strategic forces. Ten will be "type one" inspections carried out at ICBM bases, ballistic missile submarine (SSBN) bases and heavy bomber air bases. "Type one" inspections will allow the sides to confirm the accuracy of declared data regarding deployed and non-deployed systems at ICBM bases, SSBN bases and heavy bomber air bases. Moreover, when an inspection team arrives at an ICBM base or SSBN base, it will be told the aggregate number of warheads on deployed ICBMs or SLBMs at the base, and the number of reentry vehicles on each individual deployed ICBM or SLBM. The team will have the right to inspect an individual missile (one per inspection) to confirm that the number of reentry vehicles conforms to the number declared. In addition, the team will have the right to designate one non-deployed ICBM launcher at an ICBM base or one non-deployed SLBM launcher at an SSBN base for inspection to confirm that the launcher is empty. The eight "type two" inspections will take place at other facilities and are intended to confirm data on non-deployed systems.

In addition, New START provides, as a transparency measure rather than a verification measure, that the sides will exchange telemetry on up to five strategic ballistic missile launches per side per year (telemetry is the information that a missile broadcasts during a flight test to report on its performance). START I required the sides to provide access to virtually all telemetry from their ICBM and SLBM tests, as telemetry access was required to monitor certain START I limits. New START does not have limits that require telemetry access for monitoring, but the sides agreed to a limited exchange of telemetry as a transparency step.

Current and Future Strategic Nuclear Force Structures

Under the terms of the START I Treaty, U.S. and Russian strategic forces were reduced significantly from their high points in the late 1980s, when each side deployed over 2,000 strategic nuclear delivery vehicles capable of carrying more than 10,000 nuclear warheads. The last START I data update, which took place in July 2009, showed significant reductions.

U.S. and Russian Strategic Offensive Forces, July 2009[14]

	U.S.	Russia
Deployed ICBM launchers	550	465
Warheads attributed to ICBM launchers	1,600	2,001
Deployed SLBM launchers	432	268
Warheads attributed to SLBM launchers	3,264	1,288
Deployed heavy bombers	206	76
Warheads attributed to heavy bombers	1,052	608
Total launchers and bombers	1,188	809
Total warheads attributed to launchers and bombers	5,916	3,897

START I counting rules, which attributed maximum warhead loads to strategic ballistic missiles, significantly over-stated the number of warheads on both sides. While the U.S. START I accountable warhead number in July 2009 was 5,916, the Department of State's annual report to Congress on the SORT Treaty said that, as of December 31, 2009, U.S. strategic forces had 1,968 operationally deployed warheads.[15] The United States thus has already reached SORT's limit of no more than 2,200 warheads.[16] The Bulletin of Atomic Scientists estimated that the Russians deployed 2,600 strategic warheads at the beginning of 2010.[17]

The April 2010 Nuclear Posture Review spelled out the current number of U.S. strategic delivery vehicles: 450 Minuteman III ICBMs, 336 Trident D-5 SLBMs on 14 Trident ballistic missile submarines, and 94 B-2 and B-52H heavy bombers equipped for nuclear armaments. In a May statement, the Department of Defense described what the strategic force would look like once New START reductions were implemented: 240 deployed Trident D-5 SLBMs; up to 420 deployed Minuteman III ICBMs; and up to 60 deployed B-2 and B-52H heavy bombers equipped for nuclear armaments.

The U.S. Navy plans to convert four of the 24 launch tubes on each of its 14 Trident ballistic missile submarines, leaving each submarine with the capability to carry 20 SLBMs. Two submarines are typically in long-term maintenance at any one time and have no SLBMs on board (their launch tubes will count as "non-deployed" under the New START 800 limit). Thus, 12 submarines, each with 20 deployed SLBMs, amounts to 240 deployed SLBMs under the New START limit of 700 deployed strategic delivery vehicles.

With 240 deployed SLBMs, the United States will be able to deploy up to 460 Minuteman III ICBMs and heavy bombers. The Department of Defense said that the United States would also deploy at least 400 Minuteman III ICBMs and 40 heavy bombers equipped for nuclear armaments. This would leave the United States with the ability to have 20 more deployed strategic delivery vehicles under the 700 limit; the Department of Defense has yet to decide whether they will be ICBMs or heavy bombers.

The Department of Defense has stated that all Minuteman III ICBMs, which can carry up to three warheads, will be downloaded so that each carries only a single warhead. Thus, 460 single-warhead Minuteman III ICBMs and heavy bombers attributed as only one warhead will count for 460 warheads under the 1,550 limit, allowing the U.S. Navy to have up to 1,090 warheads on its 240 deployed SLBMs.

The Russians have not yet disclosed how they will structure their strategic forces under the New START limits. Since they originally proposed a limit of no more than 500 deployed ICBMs, SLBMs and heavy bombers equipped for nuclear armaments, one can infer that they will deploy fewer strategic delivery vehicles than the 700 that the treaty permits. Some non-governmental analysts project that the number of deployed Russian strategic delivery vehicles may decline to around 400, many of which will be MIRVed ICBMs and SLBMs.

Notional U.S. and Russian Strategic Offensive Forces under New START

	U.S.[18]	Russia[19]
Deployed ICBMs	420	192
Warheads on deployed ICBMs	420	542
Deployed SLBMs	240	128
Warheads on deployed SLBMs	1,090	640
Deployed heavy bombers	40	76
Warheads attributed to deployed heavy bombers	40	76
Total deployed ICBMs, SLBMs, heavy bombers	700	396
Total warheads attributed	1,550	1,258

These are the sorts of forces that the sides will be considering when they formulate proposals for the next round of negotiations. (It should be noted that, although the sides should have no trouble meeting the 1,550 warhead limit, in the end both will likely deploy more than 1,550 warheads, depending on the actual number of weapons on bombers, since each bomber is attributed as having only one warhead.) If the United States continues its recent rate of downloading, it will likely reach the 1,550 warhead limit early in the New START implementation process.

3. Limiting Deployed Strategic Warheads, Delivery Vehicles and Launchers

Reducing the Deployed Strategic Warhead Limit

The Obama administration envisages New START as the first step in a continuing process of reducing nuclear weapons. While it is not clear how enthusiastic the Russians are about further reductions, President Medvedev has agreed in principle to work toward further cuts. In addition to the language on step-by-step reductions in their April 2009 joint statement, the preambular language in New START notes that the sides seek "to preserve continuity in, and provide new impetus to, the step-by-step process of reducing and limiting nuclear arms, while maintaining the safety and security of their nuclear arsenals, and with a view to expanding this process in the future, including to a multilateral approach."

If New START is ratified and enters into force, and the sides agree to new negotiations, one of the first questions they will have to tackle will be: what should be the limits on deployed strategic warheads and the associated limits on strategic delivery vehicles and launchers? Five likely issues to consider will be: a new strategic warhead limit, how to deal with conventional ballistic missile warheads, whether to change the bomber weapon counting rule established in New START, the limits on strategic delivery vehicles and launchers, and possible sublimits.

New START sets a limit of 1,550 warheads. Reports in early 2009 suggested that some in the Obama administration were interested in reducing deployed strategic warheads to 1,000 on each side, but U.S. negotiators ended up proposing a limit of 1,500. A more dramatic reduction proposal would have required more time to negotiate, but Washington (and Moscow) faced the December 2009 deadline for the expiration of START I.

It is unlikely that between now and the beginning of the next round of negotiations—presumably some time in 2011 after (if) New START is ratified and enters into force—the United States will conduct a review that would lead to a radical shift in U.S. nuclear doctrine or force posture (e.g., to move to a minimal nuclear deterrent force as argued by some). This paper thus assumes that the next round of negotiations will take a more incremental approach to reductions, given considerations such as: less radical reduction proposals may be necessary to engage Russia, particularly if the U.S. government seeks to keep the next round constrained to limits on U.S. and Russian forces only; and a more incremental approach may be needed to produce a treaty that could win Senate consent to ratification. For Senate ratification, considerations such as maintaining the strategic triad could play an important role.

One factor the Obama administration will need to consider in proposing a warhead limit is whether that limit permits the U.S. military enough warheads to carry out its nuclear war plans should that prove necessary, i.e., the targeting requirements. The president can affect the plans by providing guidance as to what he believes needs to be accomplished. Were the president to adopt a minimal deterrent posture requiring that U.S. strategic forces be capable of holding at risk only a few dozen of a potential adversary's urban centers or key industrial and crucial infrastructure sites, the U.S. military would require a significantly lower number of nuclear weapons. The more

demanding the objective, e.g., to the extent it also includes requirements to strike a potential adversary's nuclear and major conventional force installations in addition to holding at risk major industrial facilities, the higher the number of survivable warheads that the operational plan will require. The less demanding the objective, the fewer the number of survivable warheads the operational plan will require, and U.S. negotiators could seek a lower limit.[20]

One other consideration the administration must take into account is cost, at a time when any real effort to address the budget deficit will have to look at reductions in defense spending. Some suggest that strategic nuclear weapons programs should be part of any defense spending cuts, questioning, for example, whether the U.S. Navy needs 14 ballistic missile submarines. As part of the effort to secure support for New START ratification, however, the administration has said that it will devote $100 billion over the next ten years to modernize the strategic deterrent, in addition to $80 billion over the same time frame to modernize the nuclear weapons complex.

The Obama administration might consider proposing 1,000 as the deployed strategic warhead limit in the next round of negotiations. A limit of 1,000 would represent a significant cut—35 percent—below the New START limit. At the same time, 1,000 may be high enough that neither the United States nor Russia feel that third-country forces would need to be limited as part of this agreement. One thousand deployed strategic warheads should be large enough so that the United States could continue to maintain a strategic triad—ICBMs, SLBMs and heavy bombers—though it will begin to stress the U.S. ability to do so. (For example, Trident SSBNs might end up going to sea with SLBMs carrying as few as 40 strategic warheads on board, and/or the U.S. Air Force might have to consider reducing from three ICBM bases to two.)

Handling Conventional Warheads on Strategic Ballistic Missiles

In a new agreement, the sides presumably would continue to use New START's "actual load" counting rule for counting warheads on ICBMs and SLBMs. Although neither the United States nor Russia at present deploys conventional warheads on ICBMs or SLBMs, were they to do so, those warheads would count under New START's 1,550 warhead limit. Having accepted this in New START, it would be difficult for the United States to exclude conventional warheads on strategic ballistic missiles from being counted in a subsequent agreement.

The Department of Defense describes plans for conventional warheads on strategic ballistic missiles as a "niche capability," suggesting that the requirement for conventional warheads would be in the tens. (The Bush administration's "Prompt Global Strike" plan, which never went forward, envisaged placing less than 30 conventional warheads on Trident D-5 SLBMs.) Such a small number of conventional warheads would not cut deeply into an allowance of 1,000 overall deployed strategic warheads. Some strategic analysts, however, are uncomfortable as a matter of principle with the START process limiting any conventional capabilities.

Counting Bomber Weapons

A third issue would deal with counting bomber weapons. Heavy bombers equipped for nuclear armaments are each attributed with one warhead under New START's 1,550 limit. U.S. and Russian heavy bombers normally have no weapons on board, but a zero count would undervalue their operational significance. However, they can carry many more than one (the B-52H, for example, can carry up to 20 ALCMs). The preferential aspect of New START's treatment for bombers was justified by the fact that aircraft—because of their long flight times, eight-ten hours—do not pose the same threat of a surprise attack as ballistic missiles, with flight times of 15-30 minutes. The effect of this rule is that, for both sides, the number of warheads deployed on strategic ballistic missiles plus the number of weapons at heavy bomber air bases intended for use by those bombers will likely exceed 1,550. For example, take a notional U.S. force structure of 420 single-warhead ICBMs, 240 Trident D-5 SLBMs carrying 1,090 warheads, and 40 heavy bombers.

If one assumed that the average weapons load for U.S. bombers was six-eight weapons, the 700 deployed U.S. strategic delivery vehicles could actually carry in a single strike 1,790 warheads, even though New START would only count this force as 1,550 warheads. That would mean 240 "uncounted" warheads in excess of the limit.

The logic underpinning the bomber weapon discount rule is understandable. It would have been preferable, however, to have a counting rule in New START that did not discount bomber weapons so steeply, e.g., a rule that attributed three-four weapons per bomber rather than one. This would have still given bombers preferential treatment compared to ballistic missiles, but it would have reduced the number of "uncounted" weapons on the bomber forces of both sides. The sides will have to consider this in the context of a lower overall limit in the next negotiation. Some New START critics cite the bomber weapon counting rule as creating a situation in which 1,550 warheads is not the "real" limit. If the warhead limit were reduced in a follow-on agreement while the bomber weapon counting rule remained one weapon, the number of "uncounted" warheads could increase as a percentage of the warhead limit. That could appear to undermine the impact of the overall treaty as well as lead to more specific criticism of a new agreement. While maintaining the principle of discounting, U.S. negotiators in the next round might consider a bomber weapon attribution rule that counts each nuclear-capable bomber as carrying three-four warheads.

An alternative approach would be to count the number of nuclear weapons for bombers (ALCMs and bombs) stored at heavy bomber air bases under the deployed strategic warhead limit. This would require monitoring measures that would permit inspection teams to enter weapons storage facilities (e.g., bunkers) at air bases and check the number of nuclear weapons—a more intrusive verification regime than the New START Treaty requires at heavy bomber air bases. U.S. negotiators reportedly proposed a variant of this in the New START negotiation, but the Russians preferred an attribution rule.

Yet another approach—since neither the United States nor Russia normally maintains nuclear weapons on board heavy bombers—would be to treat all nuclear weapons for heavy bombers as non-deployed strategic warheads (see chapter 5). In this case, the deployed strategic warhead limit would cover only warheads on ICBMs and SLBMs. While there is a logic to this approach, nuclear weapons at air bases could be loaded on to bombers relatively quickly (much more quickly than, say, putting additional warheads on ballistic missiles). Moreover, it is not clear that counting bomber weapons as non-deployed would prove acceptable to the Russians. It might also be problematic with some in the U.S. Senate; although the United States has traditionally placed greater weight than has Russia on the bomber leg of the triad, under New START the United States plans to reduce its nuclear-capable heavy bombers from 94 to 40-60, while the Russians could maintain their current number of 76.

Limits on Strategic Delivery Vehicles

A new agreement would presumably maintain the structure of New START's limits. Thus, the limit on deployed strategic warheads would be accompanied by a limit on deployed strategic delivery vehicles (ICBMs, SLBMs and heavy bombers) and a limit on deployed and non-deployed ICBM and SLBM launchers and heavy bombers.

Russian Considerations. In the next round of negotiations, the Russians will almost certainly press to reduce the limit on deployed strategic delivery vehicles to a level below 700, which would require cuts in U.S. strategic delivery vehicles. In the New START negotiations in 2009, the Russians proposed a limit of 500, from which one can infer that their deployed strategic delivery vehicle requirement will be 500 or less. As noted earlier, some project that Russian strategic forces may decline to around 400 deployed ICBMs, SLBMs and heavy bombers. Since the Russian strategic delivery vehicle count is likely to be 400-500, reducing the limit below 700 would reduce U.S. strategic delivery vehicles with no strategic delivery vehicles reductions required on the Russian side, similar to New START. The Russians could choose to take their reductions under a new

agreement by downloading warheads but maintaining the same number of ICBMs and SLBMs.

Second, the Russians may seek lower limits on deployed strategic delivery vehicles as a means of constraining U.S. "upload" capacity. Under New START, the U.S. Air Force will deploy Minuteman III ICBMs, which can carry three warheads, downloaded to carry only a single warhead. Minuteman III ICBMs will have an upload potential of one or two warheads, i.e., the potential to return warheads to deployed missiles. Trident D-5 SLBMs likewise will have an upload potential, as the average Trident D-5 will carry less than its capacity of eight warheads. A lower limit on deployed strategic delivery vehicles would reduce the U.S. upload potential.

The Russians might be concerned that, were the warhead limit reduced to 1,000 while the limit on strategic delivery vehicles to remain at 700, U.S. upload capacity would increase. As the United States further downloaded ICBMs and SLBMs to meet the 1,000 warhead limit but kept the same number of strategic missiles, the missiles would have that many more spaces to which warheads could be returned.

Setting aside the question of upload potential, an argument against reducing the limit on deployed strategic delivery vehicles stems from strategic stability considerations. A larger number of strategic delivery vehicles would allow the sides to spread their warheads over more launchers. If a side has its 1,000 deployed strategic warheads on 700 deployed strategic delivery vehicles, the force will pose a broader target set and thus be less inviting of a first strike than if those 1,000 warheads sit on 400 delivery vehicles.

The Russians, however, appear less concerned about this stability argument and seem ready to deploy a smaller number of strategic delivery vehicles. U.S. negotiators in the next round should expect a Russian press to reduce the 700 limit. Whether or not that is acceptable to Washington will likely depend on the other terms of a possible agreement.

U.S. Considerations. In weighing a lower strategic delivery vehicle limit, Washington would want to consider its ability to maintain the strategic triad (the Nuclear Posture Review stated that the United States would maintain a triad for the foreseeable future). Under New START, the U.S. Air Force will reduce the number of its nuclear-capable heavy bombers to 40-60. It is difficult to imagine reductions under a new agreement to a level below 40 that would sustain a robust bomber leg of the triad. Thus, if the limit on deployed strategic delivery vehicles were to fall below 700, the cuts would fall on ICBMs and SLBMs, or would mean a transition to a strategic dyad composed only of ICBMs and SLBMs.

The U.S. Air Force could reduce the number of Minuteman III ICBMs, but ICBMs have high alert rates, are per system the least costly leg of the triad to operate, and, when armed with single warheads, are not particularly attractive targets (a conservative attacker would allocate two warheads to each silo, a poor exchange ratio). The U.S. Navy could further "detube" its Trident submarines, that is, remove SLBMs and convert missile tubes beyond the four missile tubes on each Trident boat that it plans to convert as it implements the New START reductions. (The Navy will soon begin a study of a follow-on SSBN; such a future SSBN will likely have fewer SLBM launch tubes than the Ohio class, perhaps 16.)

Under a deployed strategic delivery vehicle limit of 600, the United States could maintain a notional force of 40 deployed heavy bombers, 192 deployed Trident D-5 SLBMs (16 SLBMs on each of 12 Trident submarines, with two submarines in long-term maintenance and carrying no SLBMs) and 368 deployed Minuteman III ICBMs. A limit of 500 deployed strategic delivery vehicles would allow a notional U.S. force of 40 deployed heavy bombers, 144 deployed Trident D-5 SLBMs (12 each on 12 submarines) and 320 Minuteman III ICBMs. Either of these would maintain the triad but involve difficult decisions among constituencies that favor different legs of the triad. Based on current trends, a limit of 600 deployed strategic delivery vehicles—indeed, or any limit above 500—would not force the Russians to make such choices. (This could pose a political problem in any Senate ratification debate; treaty critics might object to provisions that

require strategic delivery vehicle reductions only on the U.S. side.)

If the next negotiations were to agree on a reduction in the limit on deployed strategic delivery vehicles, a related issue would be whether the New START limit of 800 deployed and non-deployed ICBM and SLBM launchers and heavy bombers equipped for nuclear armaments should also be lowered. If U.S. strategic forces could live within a deployed strategic delivery vehicle limit of 500-600, cutting the 800 limit to 600-700—which would still allow each side to have 100 "non-deployed" ICBM and SLBM launchers and heavy bombers—should not pose a major problem. There would likely be no issue for Russian strategic forces.

Sublimits on Deployed Strategic Warheads

When considering the three numerical limits, the question of sublimits that would encourage the sides to move away from certain types of strategic systems could arise. START II, which was signed but never entered into force, banned heavy ICBMs and MIRVed ICBMs. Some strategists may be concerned that, under New START, the Russians apparently will maintain their permitted warheads on only 400 or so delivery vehicles, including on MIRVed ICBMs (by contrast, all U.S. ICBMs will be downloaded to carry a single warhead).

The merit of a sublimit on silo-based MIRVed ICBMs is that it would force the Russians to move away from what are regarded as the most destabilizing systems. However, if the Russians place their MIRVed ICBMs—such as the RS-24—on road-mobile launchers, this will make them more survivable than silo-based ICBMs and alleviate much of that concern.

U.S. negotiators in the next round are in any case unlikely to press for sublimits on silo-based MIRVed ICBMs. First, having no sublimits gives each side the freedom to choose its force structure as it downsizes, which will make force structure decisions based on the differing security considerations of both sides easier. Second, the Russians appear to favor MIRVed ICBMs as a way to maintain a larger number of warheads with a smaller investment in strategic ballistic missiles. It would be very difficult to persuade them to accept sublimits that require that they increase production of single-warhead ICBMs to maintain rough parity in overall warhead numbers.

Russian Readiness for Further Cuts

A major question for the next round of negotiations will be Russian readiness for further cuts in deployed strategic forces. During the New START negotiations, some members of the Russian team reportedly suggested that, for the foreseeable future, Moscow would not be ready to reduce the limits below those that emerged from New START. Some Russian nongovernmental analysts also believe that Russia will not be enthusiastic about further reductions in the near- to mid-term, for several reasons.

First, Russian conventional forces have declined significantly since the end of the Soviet Union in 1991. While Moscow is reforming its military and beginning to procure new conventional military arms, the process will be lengthy, and Russian conventional forces are unlikely in the near future to regain anything approaching their stature 20 years ago. Thus, Moscow has come increasingly to see strategic and tactical nuclear weapons as offsetting conventional disadvantages and providing the ultimate guarantor of Russian security.

Second, strategic nuclear weapons parity with the United States represents what is probably Moscow's strongest remaining claim to superpower status. Further reductions in those forces would diminish the margin between Russia and the United States, on the one hand, and other nuclear powers such as Britain, France and China, on the other, and undermine Russia's superpower position.

Third, Moscow remains concerned about future U.S. missile defense deployments and the impact that such deployments could have on Russia's strategic nuclear deterrent. The lower the level of Russian strategic ballistic missile forces, the greater will be their concern about the impact of U.S. missile

defense on Russia's ability to maintain a viable strategic deterrent against the United States.

Set against these considerations are statements—by President Medvedev and in the New START preamble—indicating that Moscow would agree to further nuclear arms reduction negotiations. President Obama has staked out a clear position for further nuclear reductions; Russia would run the risk of being seen as the party holding the process up were it to drag its heels on considering further strategic arms cuts. In the end, Russian readiness to countenance further reductions will depend on a variety of factors, including the course of the "reset" in the broader U.S.-Russian relationship, the direction and pace of U.S. missile defense developments, China's growing military power, NATO's nuclear posture and the fate of the CFE regime.

4. Limiting Non-Strategic Nuclear Warheads

A Large Imbalance

One of the major criticisms of New START during the U.S. Senate ratification hearings was that the treaty did not reduce or constrain non-strategic (also referred to as tactical or substrategic) nuclear weapons, an area where the Russians have a very large numerical advantage. The Obama administration responded that New START was never intended to limit tactical nuclear weapons; rather it was to replace START I. However, President Obama stated in April: "While the New START treaty is an important first step forward, it is just one step on a longer journey. As I said last year in Prague, this treaty will set the stage for further cuts. And going forward, we hope to pursue discussions with Russia on reducing both our strategic and tactical weapons, including non-deployed weapons."[21]

The United States and Russia have not previously negotiated on non-strategic nuclear weapons, with one notable exception: the 1987 U.S.-Soviet agreement on intermediate-range nuclear forces (INF). That agreement eliminated all land-based U.S. and Russian ballistic and cruise missiles with ranges between 500 and 5,500 kilometers. If the sides take on non-strategic weapons in the next round, they will face several challenging issues.

Both Russia and the United States deployed large tactical nuclear arsenals during the Cold War, focused on Europe. At the end of the Cold War, Russia's total tactical weapons arsenal was estimated to number around 21,700 (this figure likely included retired weapons).[22] It comprised many different weapons types, and those weapons were, and are, deployed for use by a variety of dual-use delivery systems (systems that can deliver nuclear or conventional munitions). Likewise, at peak levels in the early 1970s, the United States deployed more than 7,200 tactical nuclear weapons in Europe for use by a dozen different types of U.S. and allied delivery systems.[23] At the end of the Cold War, an estimated 4,000 U.S. nuclear weapons remained in Europe.[24]

With the end of the Cold War, Presidents George H. W. Bush and Mikhail Gorbachev announced a number of presidential nuclear initiatives to reduce tactical nuclear weapons arsenals in the early 1990s. For example, Washington announced the elimination of all ground-launched short-range nuclear weapons, such as nuclear artillery shells, and the removal of all nuclear weapons from U.S. Navy ships except for those deployed on SLBMs. The parallel initiatives were unilateral and not legally-binding, and there was no verification regime in place to ascertain the actual scope of reductions. Questions have arisen as to whether Russia fully implemented its declared initiatives.

Today, the Russian non-strategic nuclear arsenal remains much larger in size and scope than its U.S. counterpart, although it poses less of a threat than during the Cold War. While the current number and location of Russia's tactical nuclear weapons are classified, estimates range from 2,000 to 8,000, and can reach as high as 12,000, depending on the source. A 2009 Congressionally-mandated Strategic Posture Commission report placed Russian tactical nuclear weapons at 3,800.[25] Other independent

estimates have placed Russia's tactical nuclear arsenal over the past eight years at 5,300 (of which 2,050 were considered active), 3,380 and 6,360 respectively.[26] Those weapons reportedly include nuclear warheads for the Moscow anti-ballistic missile (ABM) system, SA-10 surface-to-air missiles, sea-launched cruise missiles, anti-submarine weapons, torpedoes and gravity bombs.

In contrast, the United States maintains a much smaller non-strategic nuclear arsenal, comprised of nuclear sea-launched cruise missiles (the Tomahawk Land Attack Missile/Nuclear or TLAM/N) and B61 gravity bombs. The TLAM/N warheads have been in storage since the early 1990s as a result of the U.S. presidential nuclear initiatives. The Department of Defense announced in its April 2010 Nuclear Posture Review that the TLAM/Ns would be retired, leaving only B61 bombs in the U.S. tactical nuclear arsenal. [27] In light of the Nuclear Posture Review decision, the Federation of American Scientists estimates that, once the TLAM/Ns are retired, the United States will retain 400 B61 tactical gravity bombs, half of which are purported to be stationed on European soil for use by U.S. and allied aircraft.[28]

Russian tactical nuclear weapons have, in Moscow's view, taken on a balancing role similar to the purpose of NATO's nuclear arsenal during the Cold War: to offset perceived Russian conventional disadvantages vis-à-vis NATO and China. The White Paper released by Minister of Defense Sergey Ivanov in October 2003 corroborates statements on the potential use of nuclear weapons in regional and large-scale wars that were made in Russia's 2000 Military Doctrine.[29] While the 2010 Russian Military Doctrine was expected to advance a larger role for nuclear weapons in Russia's military posture, it in fact described a more modest role for nuclear arms than previously ascribed to the weapons.[30]

This imbalance in non-strategic weapons numbers, plus the greater importance that Russia appears to attach to tactical nuclear weapons following the Cold War, will complicate any negotiating effort to reduce these weapons. More so than with strategic nuclear arms, Moscow likely will factor in its concerns vis-à-vis third countries such as China in determining the number of tactical weapons that it requires in its arsenal.

Although negotiating these issues will be difficult, Washington has likely reached the point where it must include non-strategic nuclear weapons in the process. It is difficult to see how the United States could reduce its deployed strategic warheads much below New START's 1,550 limit without some constraints on non-strategic weapons.

Principles for Negotiating Non-Strategic Nuclear Weapon Limits

In developing an approach to limits on non-strategic or tactical nuclear weapons, Washington could consider several principles. First, in contrast to limits on strategic nuclear forces, which constrain both warheads and strategic delivery systems, limits on non-strategic nuclear weapons might focus on warheads only. That is because most delivery systems for such nuclear weapons—e.g., the U.S. Air Force F-16 for the B61 bomb—are dual-use: they can carry conventional or nuclear munitions. In most cases, conventional roles are their primary task. It is unlikely that the U.S. or Russian militaries would want to see conventional tactical strike capabilities reduced as a result of a limit on non-strategic nuclear weapons.

Second, the United States will presumably seek, consistent with its overall approach to nuclear arms control with Russia, equal limits on U.S. and Russian non-strategic nuclear weapons. It is hard to conceive the administration negotiating, or the Senate consenting to ratification of, an agreement that contains unequal limits. That said, equal limits may still produce a *de facto* unequal outcome. A sufficiently high numerical limit on non-strategic nuclear weapons—indeed, any limit greater than the current number of U.S. B61 tactical bombs—could be equal but would leave the Russians with a *de facto* advantage, as the United States plans to refurbish the B61 but does not intend to increase its tactical nuclear arsenal. (Another way to deal with this issue is to combine limits on non-strategic and non-deployed strategic warheads, which is discussed in chapter 6.)

Third, given that tactical nuclear weapons are mobile, Washington presumably will consider global rather than regional limits. An approach that limited tactical nuclear weapons in Europe only could be easily undercut; it would be a relatively simple matter to move the weapons back into Europe. Moreover, such a regional approach could have the effect of pushing excess Russian warheads east of the Urals. That would be problematic for Russia-China relations. U.S. allies in the Far East, such as Japan and South Korea, as well as other states in the region also would not appreciate it.

Along with global limits, U.S. negotiators might consider the possibility of some locational restrictions, for example, "keep out zones" for tactical nuclear weapons that would prohibit such weapons from being deployed within a certain distance of NATO-Russia borders. This could reassure NATO allies, but monitoring would be problematic. An effect similar to a "keep out zone" might alternately be achieved by requiring that non-strategic weapons be stored at centralized storage sites.

A fourth principle for the United States should be that any limit on non-strategic nuclear weapons that would affect U.S. nuclear weapons in Europe would require prior consultations with NATO allies. Senior U.S. officials see little or no military value to U.S. tactical nuclear weapons in Europe; the issue is their political value. Rightly, the Nuclear Posture Review deferred the question of U.S. nuclear weapons in Europe to NATO channels. At the moment, NATO allies appear divided over the value of those weapons.[31] The new NATO Strategic Concept, to be released in November at the NATO Lisbon Summit, will presumably begin to address the nuclear question and describe—or more likely task further work on—NATO's nuclear policy and posture. Some countries, such as Germany, the Netherlands, Belgium and Norway, believe the United States can extend deterrence to NATO without having nuclear weapons physically located in Europe. Other NATO allies, such as Poland, the Czech Republic and the Baltic states, see continued value in U.S. nuclear weapons being deployed in Europe, given their greater wariness about Russian intentions. Washington may wish to consider reviving a forum such as the Special Consultative Group, which served as the venue for U.S.-NATO consultations during the INF negotiations in the 1980s, in order to discuss how tactical nuclear weapons would be handled in U.S.-Russian negotiations.

Negotiating Issues

The U.S. government has not indicated how it would approach the issue of limiting non-strategic nuclear weapons in detail. Speaking to NATO foreign ministers in late April, Secretary Clinton said: "In any future reductions [of U.S. nuclear weapons in Europe], our aim should be to seek Russian agreement to increase transparency on non-strategic nuclear weapons in Europe, relocate those weapons away from the territory of NATO members, and include non-strategic nuclear weapons in the next round of U.S.-Russian arms control discussions."[32]

For their part, some Russian experts have called for removing tactical nuclear weapons to centralized storage depots on national territory, which would require the withdrawal of all U.S. tactical nuclear weapons from Europe. The Russians have suggested that withdrawal of U.S. nuclear weapons from Europe should be a prerequisite for any subsequent measures regarding tactical nuclear forces. Russian Foreign Minister Sergey Lavrov stated:

> "We acknowledge that within the designated system approach, we are ready for a comprehensive discussion of any security problems, including such a complex issue as NSNW [non-strategic nuclear weapons]. At the same time, we believe that it is quite logical to start considering NSNW-related themes with the solution, on a universal basis, of the question of returning all stockpiles of such weapons to the territory of the states to which they belong. This would enhance both the physical protection and technical security of the nuclear weapons. There is also a need for complete elimination of the entire infrastructure for the rapid deployment of NSNW in the territory of European NATO

member states. This could be an important confidence-building measure. Areas free of nuclear weapons would be significantly expanded."[33]

Washington is unlikely to agree to withdrawal of its nuclear weapons from Europe as a prerequisite for discussing limitations on such systems. Still, the Russians may insist that basing tactical nuclear weapons on national territory be a part of any arrangement imposing reductions in and limitations on tactical nuclear weapons. The United States therefore may find that is has to weigh that outcome in the context of the other terms of a follow-on agreement to New START, in consultation with its NATO allies.

Much of the reaction to a limit on tactical nuclear weapons (and/or a requirement that they be based on national territory) would depend on the numerical limit. The lower the limit—and the greater the cut required in Russian tactical nuclear arms—the more attractive it would be to Washington and the more likely that NATO allies might accept removal of U.S. tactical nuclear weapons from Europe as the price of agreement. Conversely, the higher the limit, the greater the likelihood that such a limit would be acceptable to Russia.

The Russians may be able to make an argument that, given their geopolitical circumstances, they have a greater requirement for non-strategic nuclear weapons than does the United States. It is difficult, however, to see a plausible rationale for the current numbers of tactical nuclear weapons that the Russians deploy. Moreover, many of the Russian tactical weapons are obsolete. Any agreement should require that Russia cut its tactical nuclear arsenal to a more rational level. Finding a number that satisfies U.S., NATO and Russian concerns will not be easy. Monitoring that limit will pose major challenges, which will be addressed in the chapter on verification issues.

If the United States were to agree to an outcome under which tactical nuclear weapons could be based only on national territory, it might consider a provision allowing for temporary deployment of such weapons overseas. There is an antecedent for this: Article IV of the New START Treaty, which requires that strategic offensive arms be based on national territory, provides for temporary location of heavy bombers outside of national territory, subject to notification to the other side. A similar provision in a new treaty which gave the United States the ability to temporarily locate tactical nuclear weapons outside of the United States, for example, at bases in NATO Europe, might assuage the concerns of some NATO allies who are reluctant to see withdrawal of U.S. tactical nuclear weapons. Since the deployment forward of such weapons would in all likelihood be intended to send a political signal of U.S. commitment during an acute crisis, the notification requirement would not appear to pose a problem. (In considering this, however, the U.S. government would have to weigh how such a move might be received by different European publics. Some NATO allies might welcome the provision if it proved part of a deal that led to the removal of U.S. nuclear weapons from Europe; whether European publics—or governments—would be prepared to see those weapons redeployed to Europe in a crisis would be a very different question.)

Tactical Nuclear Weapons and U.S. Extended Deterrence

In consulting with its NATO allies, the United States will have to take account of the impact of any agreement on the U.S. ability to extend deterrence to its European allies. Over the past fifty years, U.S. nuclear weapons based in Europe have been seen as a central piece of extended deterrence and reassurance to allies of the U.S. commitment. Some NATO allies believe that the presence of U.S. nuclear weapons on the European continent is no longer required in order for the U.S. extended deterrent to be effective; they argue that U.S. extended deterrence can be provided by U.S.-based strategic systems, just as the U.S. extended deterrent to countries such as Japan, South Korea and Australia is provided by U.S.-based strategic forces. But this question will require careful management so as not to unnerve other allies who still see value in forward-based U.S. nuclear weapons or who might be tempted to develop their own nuclear weapons capability.

NATO consultations would touch on a variety of issues, including nuclear burden-sharing arrangements. Currently, a number of NATO allies "share" the Alliance's nuclear burden by having U.S. nuclear weapons deployed on their territory and/or maintaining dual-capable aircraft and crews equipped and trained to deliver U.S. nuclear weapons. Any reduction in or withdrawal of U.S. nuclear weapons would affect burden-sharing within the Alliance. Decisions on this could affect other questions, including extending the life of the B61 nuclear bomb and equipping the Joint Strike Fighter with a nuclear capability.

Tactical Nuclear Weapons and the CFE Regime

The Russians assert that they need tactical nuclear weapons because of conventional force imbalances, including with NATO. Moscow in 2008 suspended its implementation of the 1990 Conventional Armed Forces in Europe Treaty, arguing that the treaty had become outdated with a bloc-to-bloc structure that no longer reflected Europe's reality. The Russians have instead called for ratification and entry into force of the 1999 Adapted CFE Treaty, which would replace the original treaty's bloc-to-bloc limits on key types of military equipment with national limits. (The bloc-to-bloc limits no longer make sense when most former Warsaw Pact member states have joined NATO.) NATO members, however, have declined to ratify the adapted treaty until Moscow implements certain commitments it made when the adapted treaty was signed.

It is not clear whether or how the CFE Treaty regime can be maintained. If, however, a mutually acceptable solution were found to revive the CFE regime, that might provide Moscow some additional assurance regarding the overall balance of conventional forces in the European region. That, in turn, could reduce Russia's perceived requirement for tactical nuclear weapons in the European region. But the future of the CFE regime remains very uncertain. Regardless of whether or not the CFE regime is maintained, the conventional balance in Europe will affect Moscow's thinking on nuclear weapons.

5. Limiting Non-Deployed Strategic Warheads

The Non-Deployed Strategic Weapons Issue

Another issue will be how to treat strategic nuclear warheads that are not deployed on strategic delivery systems, warheads that New START does not address or limit. The Russians are concerned that extra warheads could be uploaded on to U.S. ICBMs and SLBMs and that the United States has a substantial capacity to expand beyond the New START warhead limit of 1,550. Indeed, the planned U.S. strategic force under New START appears to have the capacity to upload well over 1,000 and perhaps as many as 1,500 warheads on ICBMs and SLBMs. Russian concern over U.S. upload potential could grow further if the limit on deployed strategic warheads is reduced below 1,550 without some proportionate reduction in strategic delivery vehicles.

The Russians likely will not have this kind of breakout capability, as they apparently intend to reduce (and eliminate) their ballistic missiles but maintain full or relatively full warhead loads on each remaining missile. If, as expected, the Russians reduce down to 400-500 total strategic delivery vehicles, they will have substantial room under the 700 limit to build new ballistic missiles, but that process would take longer than it would take for the United States to upload existing warheads on existing ballistic missiles.

Both the United States and Russia will want to maintain a certain number of non-deployed ballistic missile warheads for use as spares. Under the George W. Bush administration, however, the United States maintained many more non-deployed warheads—estimated at as many as 2,000-2,500—as a hedge against Russian cheating, some other strategic surprise, or unexpected major failure in a U.S. warhead type.[34] Obama administration officials note that the upload potential under New START provides a disincentive to, and hedge against, Russian cheating. They have also acknowledged that non-deployed strategic warheads should be a subject in the next round of negotiations.

Limiting Non-Deployed Strategic Warheads

Including non-deployed strategic warhead limits in the negotiations might, since this is an area of substantial U.S. numerical advantage, provide Washington negotiating leverage to address non-strategic nuclear weapons, an area of substantial Russian advantage. A follow-on agreement to New START thus might trade U.S. readiness to accept a limit on non-deployed strategic nuclear warheads for Russian readiness to agree to a lower limit on non-strategic nuclear weapons than Moscow would otherwise accept. (Most of Russia's non-strategic nuclear weapons appear to be non-deployed.)

In devising its approach for the next negotiation, Washington will need to decide what level to seek for the limit on non-deployed strategic warheads. A limit in the range of 1,000-1,500 would mean a reduction from the current number of U.S. non-deployed strategic warheads. The acceptability of such a reduction would be affected by factors such as the need for spares, the need for warheads to hedge

against catastrophic warhead design failure, and progress on revitalizing the U.S. nuclear weapons complex.

The modernization of the U.S. nuclear weapons complex should enable the United States to agree to reduce its non-deployed stockpile, without sacrificing the flexibility and reliability of its strategic forces. The Obama administration plans to spend $80 billion over the next ten years to modernize the U.S. nuclear weapons complex, a significant increase over previously planned spending levels. As the nuclear weapons complex becomes more robust and capable of responding to issues regarding the U.S. nuclear stockpile, the United States may be able to accept a lower number of non-deployed strategic nuclear warheads than would otherwise be the case.

Handling non-deployed bomber weapons will pose separate issues and will depend in part on how the sides decide to limit bomber weapons in a follow-on agreement. There may be some kind of discount rule for such weapons, though preferably the bomber weapon counting rule established in New START will be replaced by one that, while still including a discount, attributes more than one weapon to deployed bombers.

One question will be how to handle bomber weapons in the case where bombers are attributed with some number of weapons, but that number is exceeded by the actual number of bomber weapons at an air base. Suppose, for example, 18 B-52Hs are stationed at an air base and attributed with four weapons each under the warhead limit, but the base maintains eight ALCMs for each aircraft (a B-52H can carry eight ALCMs internally plus an additional 12 mounted under its wings). In this case, the attribution rule would count the bombers as 72 weapons under the deployed strategic warhead limit, but there would be 144 ALCMs at the base. The additional 72 ALCMs, which would not be counted under the deployed strategic warhead limit, could be captured under a limit on non-deployed strategic warheads.

A less ambitious approach to non-deployed strategic warheads would not apply a numerical limit but would simply limit them to certain locations—ideally away from ICBM, SSBN and heavy bomber bases—and require data exchanges and regular updates. There might be other conditions that would make a major effort to prepare and move non-deployed warheads to ICBM, SSBN or heavy bomber bases detectable.

In addition to working out the limits and precise counting or attribution rules, the sides will need to examine how to monitor any limits on non-deployed strategic warheads. This question will be addressed in the "Verification Issues" chapter.

6. A Single Limit on All Nuclear Warheads?

A Single Limit

If Washington and Moscow agree that the next round of negotiations will address non-strategic and non-deployed strategic nuclear warheads in addition to deployed strategic warheads, they will for the first time have agreed to discuss limits on all nuclear weapons in their inventories. This raises the possibility that the sides might—instead of setting separate numerical limits on deployed strategic warheads, non-deployed strategic warheads and non-strategic nuclear weapons—negotiate a single limit covering all nuclear weapons. Some arms control experts argue that it is time for Washington and Moscow to move to such an approach that captures all nuclear weapons, regardless of category or deployed vs. non-deployed status.

There is logic to such an approach. In most cases, a primary difference between a strategic nuclear warhead and a tactical nuclear warhead does not turn on the weapon itself; it is the range of the delivery vehicle. The B61 nuclear gravity bomb, for example, has tactical variants that are designated for use by both U.S. (and NATO) tactical strike aircraft as well as strategic variants designated for use by the B-2 and B-52 bomber. Moreover, if the United States and Russia wish to encourage other nuclear weapons states to begin to think seriously about their part in the nuclear arms reduction process, including all U.S. and Russian nuclear weapons in the negotiations makes sense, especially as some countries, such as India, Pakistan and North Korea, do not at present have strategic-range nuclear weapons. A single limit covering all nuclear weapons would, of course, be higher than a limit on deployed strategic warheads alone.

Sublimits

A variant of this approach would be to have a single limit on all nuclear weapons with a sublimit on the weapons of greatest concern: deployed strategic warheads. Under such a limitation regime, the United States and Russia would have the freedom to choose what mix of non-strategic nuclear and non-deployed strategic nuclear weapons would make up the difference between the overall limit and the sublimit on deployed strategic nuclear warheads. For example, if the sides agreed to an overall limit of 2,500-3,000 nuclear weapons with a sublimit of 1,000 deployed strategic warheads, the United States might choose to hold a larger number of non-deployed strategic warheads while Russia might keep a larger number of tactical nuclear weapons. Washington might also consider whether to seek a second sublimit, which would cover non-strategic nuclear weapons, though this could be harder to negotiate with the Russians and might prove of marginal value.

An alternative and perhaps simpler approach would be to categorize all non-strategic nuclear weapons—assuming that they were stored at central storage sites and not mated with or stored near delivery systems—as non-deployed nuclear weapons, similar to non-deployed strategic warheads. Under this categorization scheme, there might be a limit allowing each side 2,500-3,000 total nuclear weapons, of which no more than 1,000 could be deployed strategic warheads, and all of the rest would be categorized as non-deployed or de-alerted.[35]

One last question the sides would have to discuss would be how to treat nuclear warheads that have been retired and earmarked for elimination, but are waiting in the queue for disassembly. Disassembling nuclear weapons requires time and care, and both the United States and Russia have large numbers of weapons—reportedly in the thousands on each side—in line for elimination. It is expected to take many years to clear out the warhead queues. The sides presumably will wish to treat these warheads in the queue differently than the other categories of warheads. These might be addressed by requiring that the weapons be kept at declared storage sites pending their elimination, and that there be regular data exchanges on such weapons. As the numbers of deployed nuclear warheads are reduced, the sides might have to apply tighter constraints to weapons in the dismantlement queue, so that a large number of weapons awaiting elimination did not threaten to undermine the treaty limits on other nuclear warheads.

7. Long-Range, Conventionally-Armed Precision-Guided Weapons

In the next round of negotiations, the Russians may raise the question of long-range, conventionally-armed precision-guided weapons and their impact on strategic stability. Some Russian experts assert that U.S. development of such conventional weapons gives the United States new possibilities for striking Russian strategic nuclear forces, thereby affecting the strategic balance.

In the New START negotiations, the Russians originally sought to ban conventional warheads on ICBMs and SLBMs. U.S. negotiators resisted but agreed that all warheads on ICBMs and SLBMs—conventional as well as nuclear—would count under the New START warhead limit. As long as the requirement for conventional warheads on strategic ballistic missiles remains a small "niche capability," continuing to count them under the warhead limit should not pose a major problem for the United States. (Counting conventional warheads under the strategic warhead limit might become problematic were the Department of Defense to decide that it had a larger requirement for conventional strategic ballistic missile warheads.) Presumably, continuing such an approach—which would require that the United States "pay" for each conventional warhead deployed on a strategic ballistic missile by not deploying a nuclear warhead—would satisfy the Russians regarding deployed warheads on ICBMs and SLBMs.

Russian experts also express concern about other types of long-range, conventional weapons. Moscow will carefully follow U.S. plans for and development of long-range prompt global strike systems that do not follow a ballistic trajectory for most of their flight paths, such as the hypersonic glide vehicle. The U.S. government maintains that that system would not be limited by New START. Depending on its capabilities, the Russians might seek to capture it under the limits in a new treaty.

Currently, the main focus of Russian concerns appears to be U.S. conventional air- and sea-launched cruise missiles. The conventional variant of the Tomahawk land-attack missile is highly accurate, can deliver a 1,000-pound warhead, and has a range of 1,600 kilometers (1,000 miles).[36] The U.S. Navy deploys many hundreds of these missiles, which can be launched from most surface warships, attack submarines and the four Trident submarines that have been converted from carrying SLBMs to conventional SLCMs. Twenty-two of the missile tubes on each of these Trident submarines now contain a canister with seven Tomahawk SLCMs, meaning a total of 154 SLCMs per submarine. Some Russian experts have expressed concern that conventional SLCMs could be used to attack Russian strategic forces, including ICBM silos.

It is difficult to imagine circumstances in which the United States would agree to limit conventional weapons (other than conventional warheads on ICBMs and SLBMs) as part of a New START successor treaty. The Russian concern about conventional warheads on strategic ballistic missiles has some basis, as the velocity at which such warheads would reenter the atmosphere could give them a theoretical chance of destroying a missile silo. It is more difficult to see how a 500- or 1,000-pound

conventional warhead delivered by a cruise missile would have the same effect, given the hardness of modern ICBM silos.

This question might be a worthwhile subject for informal discussions between U.S. and Russian military officials. A degree of transparency about the capabilities of these weapons could help assuage Russian concerns and reduce the prospects that this issue could emerge as a major stumbling block in the next START round.

8. Verification Issues

Monitoring Strategic Arms Limits

Verification will prove a particularly difficult question in the next negotiation if the sides agree to apply limits on non-strategic and non-deployed strategic nuclear warheads. In this case, the negotiators will have to discuss monitoring limits on warheads separated from delivery systems (New START provides for inspecting and counting only those warheads that are on deployed ICBMs and SLBMs). Designing monitoring provisions that will provide some confidence that limits on non-strategic and non-deployed strategic warheads can be verified—while protecting sensitive information and not overly interfering with operational practices—will pose a complex challenge.

The monitoring provisions for any new limitations on strategic offensive forces should build on the measures included in the New START Treaty. The new agreement should, at a minimum, provide for a detailed data exchange; regular data updates; notifications; unique identifiers for ICBMs, SLBMs and heavy bombers; and on-site inspections. These measures will, as with New START, augment each side's national technical means of verification.

Assuming that the sides build on New START's verification provisions, a new agreement should have limits on deployed strategic warheads that can be monitored with confidence. (The sides are likely to have significantly less confidence in their ability to monitor limits on non-strategic and non-deployed strategic nuclear warheads, which will be discussed below.)

The U.S. government may wish to consider whether to modify some verification measures from New START. For example, as overall numbers are reduced, the impact of cheating becomes potentially more significant. U.S. officials might consider whether to seek more inspections per year than allowed under New START. They might also, in the interest of transparency, consider requiring that each side's data exchange and data updates include the number of warheads on each individual deployed ICBM and SLBM (New START requires only that, when an inspection team arrives at an ICBM or SSBN base, the number of warheads on each individual deployed ICBM or SLBM at that base be provided). Including this information for all deployed missiles in the data exchanges would lead to better informed choices regarding on-site inspections and raise the risk of cheating.

U.S. officials might also review the telemetry question. New START received some criticism in the U.S. Senate for providing that each side share telemetry on up to five strategic ballistic missile tests per year as a transparency measure, whereas START I required the sides to provide telemetry on virtually all tests. One reason why the Russians resisted providing telemetry on all tests was that they are currently testing a new ICBM (the RS-24) and new SLBM (the Bulava), while the United States is testing only the Minuteman III and Trident D-5, missiles on which the Russians received telemetry for 15 years under START I. However, during the duration of the next treaty (which could extend to 2025 or 2030), the United States will almost certainly begin testing a successor to the Minuteman III. Russian

interest in that missile might provide leverage to return to a START I-like regime in which the sides have access to nearly all telemetry from strategic ballistic missile tests.

Finally, U.S. officials might consider a proposal to resume perimeter monitoring at Votkinsk, where Russian mobile ICBMs are produced. This was permitted under START I, but Washington did not believe it necessary for the New START monitoring regime. Restoring a monitoring presence at Votkinsk would allow more definitive counting of Russian mobile ICBMs, which look to play a greater role in the future Russian strategic force. In order to secure this, the United States would likely have to give on some monitoring issue of concern to the Russian side; the Russians have in the past expressed interest in more closely monitoring U.S. SLBM facilities.

Monitoring Limits on Non-Strategic Nuclear and Non-Deployed Strategic Warheads

If the sides agree on limits on non-strategic nuclear weapons and/or non-deployed strategic nuclear warheads, monitoring those limits will pose daunting challenges. Counting such nuclear warheads will mean counting warheads that are not on associated strategic delivery systems or tactical delivery systems.

Washington might consider a plan that centers on requiring all non-strategic nuclear weapons and non-deployed strategic warheads to be stored at declared centralized storage sites, except during pre-notified transfers and temporary deployments. This would pick up on suggestions by some Russian experts that tactical nuclear weapons be consolidated at centralized storage depots. As a result, only strategic warheads sitting on ICBMs and SLBMs or located at strategic air bases for heavy bombers equipped for nuclear armaments would be deployed or readily deployable. (If such a proposal were tabled, the question of how to treat the Moscow ABM interceptor missiles, which are nuclear-armed, and any Russian surface-to-air missiles that are armed with nuclear warheads would have to be resolved.)

The consolidation of most, if not all, tactical and non-deployed strategic warheads at declared central storage sites could provide a monitoring opportunity. Most if not all nuclear weapon storage sites are likely already known to both sides.

A 2009 Bulletin of the Atomic Scientists publication estimated that Russian nuclear weapons have been consolidated in 48 permanent storage sites under the direction of the 12th Main Directorate of the Ministry of Defense (which has responsibility for the whole of Russia's nuclear arsenal). The publication added that Russian nuclear weapons could be broken into three categories: retired or reserve nuclear warheads centralized at national-level storage sites; operational nuclear warheads dispersed to air force, naval and strategic rocket force bases; and nuclear warheads undergoing assembly or disassembly.[37] Other Russian experts have described a similar breakdown, adding a fourth category for the United States: nuclear weapons maintained outside of U.S. national territory.

At national storage sites, Russian strategic and non-strategic nuclear weapons are believed to be co-located in the same facilities, stored in the same bunkers, storage bays and chambers. Some facilities, such as Krasnoyarsk-26, are built into the side of a mountain. The nuclear weapons storage facility at Krasnoyarsk, a national-level warhead storage site, is part of a large complex that also includes reactor and reprocessing facilities.[38] However, the vaults themselves are reported to be part of a many-level system of tunnels, about 200 meters underground.[39] Other nuclear weapons storage sites are associated with air force, navy and strategic rocket force bases, with a smaller number of bunkers, highly secured yet closer to their delivery systems. The air force and navy bases themselves support a mix of conventional, strategic and non-strategic nuclear weapons delivery systems, which may complicate monitoring.

The U.S. military has long maintained a policy of neither confirming nor denying the presence of nuclear weapons at specific locations. The Bulletin of Atomic Scientists publication reports that U.S. nuclear weapons are located at 15 sites in the United

States and six in Europe. Strategic nuclear weapons are reportedly maintained at Bangor, Washington and King's Bay, Georgia, homeports to the Trident ballistic missile submarine fleet; at Malmstrom, Minot and FE Warren air force bases (AFBs) where Minuteman III ICBMs are deployed; and at Barksdale, Minot and Whiteman AFBs, where B-52Hs and B-2 heavy bombers are deployed. U.S. tactical nuclear weapons are reportedly stored at Nellis AFB, Seymour Johnson AFB and Kirtland AFB, at the last in a large underground storage facility, in addition to NATO bases in Europe. U.S. B61 gravity bombs believed to be stored at six air bases in five NATO European countries employ a unique storage system: weapons are maintained in below-ground weapons security vaults with the ability to store up to four weapons; these are located inside individual protected aircraft shelters.[40]

The Russians may not agree to reduce and limit non-strategic nuclear weapons without U.S. agreement that such weapons will be based exclusively *on national territory*. In the context of such an agreement that all tactical nuclear weapons would be stored at centralized storage sites, a monitoring plan could focus on those storage sites and on storage sites for non-deployed strategic nuclear weapons.

It would be unrealistic now to expect Moscow—or, for that matter, Washington—to agree to an "anytime, anywhere" inspection regime to confirm that nuclear weapons had been removed from naval and air bases. National technical means might detect signs of tactical nuclear weapons outside of centralized storage areas, which would constitute a violation of the agreement unless such movements were pre-notified. (The odds of detection would be small but not zero, which would provide some—albeit limited—disincentive to a party considering moving tactical nuclear weapons covertly.)

How might a monitoring plan for non-strategic and non-deployed strategic nuclear warheads located at centralized storage sites work? The treaty could require that each side declare to the other the number and location of each of its storage sites for non-strategic nuclear weapons and non-deployed strategic warheads, as well as the number of weapons stored at each site. Each side would provide the other with site diagrams showing the number and location of weapons storage bunkers, bays or other chambers at the site. The treaty would then provide for a certain number of inspections per year, based on the precedent for New START's "type one" warhead inspections. Under New START, an inspection team arriving at a submarine base is to be given a list showing, among other things, each submarine in port and the number of warheads on each deployed SLBM on each submarine. The inspection team then can choose one of those SLBMs to inspect the number of warheads (similar rules apply for inspections of ICBM bases).

A similar monitoring mechanism for weapons storage sites might require that, on arrival at a storage site, an inspection team be given a list showing the number of nuclear warheads (perhaps broken down into the categories of non-strategic and non-deployed strategic) in each bunker, bay or chamber, following which the inspection team could choose one bunker, bay or chamber to inspect and confirm that the number of warheads matched the number declared (to raise the bar against cheating, the inspection team might be allowed to choose and inspect more than one). The sides would have to agree on equipment to be used to confirm that the warheads were indeed nuclear weapons. Resolving the technical questions so that the inspecting side had confidence that the equipment would confirm that a weapon was a nuclear weapon, but assure the inspected side that the equipment would not reveal sensitive design information about the weapon, would pose a serious technical challenge. (Considerable work has already been done on "information barrier technology" to allow counting nuclear warheads or monitoring their elimination while protecting sensitive design information. This issue was discussed in the context of possible procedures for inspection of storage containers as part of the U.S.-Russian transparency and irreversibility dialogue in 1994-1995.)

An additional step could require unique identifiers or "tags" for individual stored nuclear warheads. This would complicate cheating scenarios but would

require a degree of intrusiveness—including access to warheads—that both sides would likely be reluctant to accept.

Not having access to classified material, it is not clear how workable this approach would be for every nuclear weapons storage area. This monitoring regime would be far from perfect. It would not provide for a mechanism, other than national technical means of verification, for checking on the presence of tactical nuclear weapons or non-deployed strategic nuclear weapons outside of centralized storage areas.[41] But it could provide a basis for the sides to begin to develop confidence that the other was not deploying large numbers of non-strategic and non-deployed strategic warheads in excess of agreed limits. If the United States is serious about seeking limits on Russian tactical nuclear weapons, it will likely have to accept an imperfect verification regime, at least initially.

It would make sense for the sides to introduce this kind of monitoring regime, with all its imperfections, sooner rather than later. At notional levels of nuclear weapons for New START's successor—perhaps 1,000 deployed strategic warheads and 1,500-2,000 non-strategic nuclear and non-deployed strategic warheads—the sides would maintain sufficient deployed strategic weapons so that cheating on non-strategic or non-deployed strategic warheads would not gravely undermine their security. It would be better to have the monitoring uncertainty for non-strategic and non-deployed strategic warheads at high levels of total weapons rather than at lower levels. The experience gained in implementing such monitoring measures, moreover, could provide the sides ideas and a foundation for developing a more effective verification regime in the future.

An alternative way that might give the sides confidence in their ability to monitor the total number of nuclear weapons in the other side's arsenal would be if they could share—and check sufficiently against their own intelligence holdings to confirm—data on annual production and elimination of weapons. If a side had the other's production and elimination numbers, it could calculate the number of weapons currently in the arsenal. It could prove difficult, however, to come up with ways for a side to have confidence in the accuracy of the other's declared production and elimination numbers.

9. Third-Country Nuclear Forces

Britain, France and China

Depending on the level that the United States and Russia discuss for their deployed strategic nuclear forces, the question of incorporating third-country forces—particularly those of Britain, France and China—into the negotiations will arise. The preamble of the New START Treaty sets the goal of a "step-by-step process of reducing and limiting nuclear arms … with a view to expanding this process in the future, including to a multilateral approach." The United States and Russia each undoubtedly has some level below which it would balk at further reductions unless third countries reduced their nuclear forces or, at the least, accepted some numerical limitations.

While the British have indicated that they would be prepared to participate in a multilateral nuclear arms control discussion, the French and Chinese are more reticent. Bringing just these three countries into the negotiations, to say nothing about others such as India, Pakistan, Israel and North Korea, would greatly complicate and presumably slow the negotiating process.

Britain's nuclear deterrent consists of four ballistic missile submarines of the Vanguard class, each of which can carry 16 Trident D-5 SLBMs.[42] The British government has indicated its willingness to participate in multilateral negotiations. In a March 17, 2009 speech, then-Prime Minister Gordon Brown promised: "For our part, as soon as it becomes useful for our arsenal to be included in a broader negotiation, Britain stands ready to participate and to act."[43] Shortly after the U.S. government disclosed the total number of nuclear warheads in its inventory at the May 2010 Non-Proliferation Treaty (NPT) Review Conference, Foreign Secretary William Hague announced that Britain's nuclear arsenal would not exceed 225 weapons and that it would maintain no more than 160 operational warheads.[44] Secretary of State for Defense Robert Ainsworth said "we do not plan to revisit the conclusions of the 2006 White Paper on the nuclear deterrent" in the Strategic Defense Review, indicating that the British government intends to maintain its nuclear deterrence capabilities for the foreseeable future.[45] As part of its fall 2010 defense review, the British government decided to reduce its operational nuclear warheads from 160 to 120.[46]

Currently, French nuclear forces comprise a dyad of warheads on SLBMs and air-delivered bombs. The French navy maintains four ballistic missile submarines, each capable of carrying 16 MIRVed SLBMs. These missiles are believed to carry up to 240 warheads. In addition, France has about 60 land-based aircraft and shorter range sea-based aircraft, each able to carry one warhead.[47] In 2008, French President Nicolas Sarkozy said the size of the French nuclear arsenal would be "fewer than 300 warheads."[48]

The French government has shown much less enthusiasm than Britain for possible participation in multilateral nuclear arms negotiations, and President Sarkozy, like his predecessors, has regularly emphasized the important role that nuclear weapons play in French defense strategy. The French have not indicated when they might be prepared to join

a nuclear reductions process, and the French defense establishment reportedly is very wary of the idea.

China appears to be increasing the size of its nuclear arsenal at a modest pace.[49] It is estimated that the Chinese deploy about 175 warheads on SLBMs, land-based strategic and intermediate-range ballistic missiles, and aircraft, while maintaining an unknown number of warheads in storage.[50] Although the Chinese government has not said how many nuclear weapons it maintains, the Chinese Ministry of Foreign Affairs in April 2004 stated that "among the nuclear weapon states, China … possesses the smallest nuclear arsenal." It is unclear, however, whether the Chinese were referring to their entire arsenal or just operational warheads.[51]

Official Chinese statements on multilateral disarmament are few and always placed in the context of substantial reductions by Russia and the United States: "The two countries possessing the largest nuclear arsenals bear special and primary responsibility for nuclear disarmament. They should earnestly comply with the relevant agreements already concluded, and further drastically reduce their nuclear arsenals in a verifiable and irreversible manner, so as to create the necessary conditions for the participation of other nuclear weapon states in the process of nuclear disarmament."[52] The United States has expressed interest in a strategic dialogue with China that would cover, among other issues, transparency regarding nuclear forces and policy. The Chinese response so far is not clear; they appear unenthusiastic about the prospect of multilateral disarmament negotiations in the near term.

Possible Ways to Address Third-Country Forces

U.S. government officials hope that there is an opportunity to conduct one more round of purely U.S.-Russian negotiations before a multilateral process becomes unavoidable. Some Russian officials appear to feel the same way. Whether or not that is possible may depend on the depth of reductions that the United States seeks in the next round. If, for example, Washington proposes reducing the number of deployed strategic warheads to a level of 1,000 or more, it will be more likely that Russia will accept an approach limiting only U.S. and Russian nuclear forces than if Washington seeks more radical reductions, say, to a level of 500-700 deployed strategic warheads that would bring U.S. and Russian force levels closer to those of third countries.

If third-country nuclear forces were to be included in the nuclear arms reduction process, that could be done in several ways. One would be to broaden the U.S.-Russian negotiations to include, initially, Britain, France and China. Given the disparities in nuclear forces between the two nuclear superpowers and the other three, and the differences in their nuclear policies, such a five-sided negotiation would likely prove a complex and drawn-out process, with difficult and perhaps unpredictable negotiating dynamics.

An alternative would be for the United States and Russia to negotiate a bilateral treaty but to condition implementation of U.S. and Russian nuclear reductions on Britain, France and China accepting some kind of numerical limitations. This could be a commitment not to increase their nuclear forces above current levels or a commitment to reduce their nuclear warheads to some limit. A freeze might be set at 300 nuclear warheads, 300 being the level of France, which appears to have the largest strategic/intermediate-range nuclear arsenal of the three.

A third approach would be to proceed with purely bilateral U.S.-Russian negotiations on the next agreement while Washington and Moscow began informal consultations with London, Paris and Beijing. The purpose of those consultations would be to gain transparency regarding the nuclear postures and planned deployments of those countries, e.g., those countries might be asked to declare their numbers of nuclear weapons in the same format that the United States and Russia do by treaty. Such transparency could inform the U.S.-Russian negotiations and the outcome, as well as begin to accustom London, Paris and Beijing to their need to participate in the nuclear arms reduction process. It might also offer venues in which Washington or Moscow could suggest steps that the third countries could take to facilitate further U.S.-Russian nuclear cuts.

10. Missile Defense

Missile Defense Remains a Difficult Issue

Missile defense reportedly remained one of the last issues to be resolved before the New START Treaty could be signed. In the end, the Russians accepted that the treaty would not limit missile defense—other than prohibiting the conversion of ICBM and SLBM launchers to hold missile defense interceptors—and would not contain specific language suggesting that a side might consider withdrawal from the treaty if it believed that the other side's missile defenses threatened its strategic deterrent. The Russians settled for recording their concern in a nonbinding unilateral statement.

Moscow likely accepted this outcome because it did not believe that U.S. missile defense developments over the life of New START (ten years after entry into force) would jeopardize Russian strategic missile forces. The Obama administration appears to have halted the deployment of ground-based interceptors at 30, and the "phased adaptive approach" for the Standard SM-3 missile announced in September 2009 envisages a variant of that missile acquiring capabilities against an ICBM only in Phase Four, to be reached in 2020. That would be toward the end of New START's duration (assuming that the treaty enters into force in 2011).

The Russians are likely to take a harder look at missile defense in the context of the next round of negotiations. First, a New START follow-on treaty could have a duration stretching to 2025 or 2030, well beyond the projected initial date for deployment of a Standard SM-3 variant with capabilities against ICBMs. Second, to the extent that the United States seeks an agreement with a lower limit on deployed strategic warheads (below 1,550), Moscow may worry that its deterrence margin would be jeopardized if missile defenses were unconstrained. The Russians might believe that the best answer to a U.S. missile defense system would be to maintain or increase their number of strategic ballistic missile warheads, which would negate an effort to negotiate a new level … or perhaps even to maintain a 1,550 limit.

Engaging the Russians

Much of the Russian approach will turn on where the U.S. missile defense program is going in the coming years, and how Moscow understands the future development of that program. U.S. officials have repeatedly stated that the objective of U.S. missile defense is to defend against limited ballistic missile threats posed by rogue states, such as North Korea and Iran, and that the United States does not seek the capability to defeat a large, sophisticated Russian ballistic missile attack. Washington might consider consultations with the Russians to describe its missile defense programs, plans and deployment options, in the hope that the Russians would conclude that those programs and plans would not threaten the Russian deterrent.[53] It is unclear, however, how much confidence the Russians would place on briefings regarding programs that may be ten-fifteen years in the future.

If the Russians continue to have questions regarding the course and scale of U.S. missile defense

deployments, they may press harder than was the case in the New START negotiations for some constraints on missile defense. Constraints could include numerical limits on missile defense interceptors. They might also include constraints on the location of certain types of missile defense interceptors (even in Phase Four, the Standard SM-3 missile is projected to have a range of only 1,600 kilometers, so many locations would put the missile out of range of Russian ICBM flight-paths).

It might be possible to design limits on missile defenses that would permit the development and deployment of robust defenses against the ballistic missiles of rogue states, such as North Korea and Iran, but which would not threaten the Russian or U.S. strategic deterrent. However, missile defense is a highly politicized issue in the United States, as witnessed by the discussions about missile defense during the New START ratification hearings. The Obama administration would want to avoid a situation in the next negotiation in which the only way to secure Russian agreement to further strategic reductions below those in New START—accompanied by limits on non-strategic and non-deployed strategic nuclear warheads—would be to accept limitations on missile defense. It is very difficult in the near-term to see how the Obama administration could agree to any meaningful limits on U.S. missile defense without provoking Senate opposition that would prevent ratification of the overall treaty.

One possible path out of this conundrum is transparency regarding U.S. missile defense plans and an effort to foster U.S.-Russian cooperation on missile defense, either as a bilateral effort or in the NATO-Russia context. Genuine cooperation, for example, to defend Europe (including European Russia) against attack by third-country ballistic missiles, might prove a "game-changer" with regard to Russian attitudes on missile defense. Day-to-day work between Russian and U.S./NATO military officers in operating a cooperative missile defense system would enhance transparency and promote better mutual understanding—and perhaps might help persuade the Russians that the U.S./NATO elements of the missile defense system were not directed against Russia. Washington should continue to urge Moscow to engage in missile defense cooperation.

During summer 2010 exchanges, former Secretary of State Madeleine Albright, Brookings President Strobe Talbott, former Russian Foreign Minister Igor Ivanov and Institute of World Economy and International Relations (IMEMO) Director Alexander Dynkin developed a paper that, among other things, laid out principles for U.S.-Russian cooperation on missile defense.[54] The principles included: defending against ballistic missiles with ranges below strategic range (5,500 kilometers); transparency regarding U.S. and Russian systems with capabilities to intercept ballistic missiles and their deployment options; initial focus on defending Europe, including European Russia; aim for a combined rather than joint system (as, at least initially, neither side would be prepared to subordinate itself to the other's command, and short flight times would not allow for joint decisions about whether to launch an interceptor missile); and dividing intercept responsibilities so that the United States/NATO would engage missiles aimed at NATO Europe, while Russia engaged missiles aimed at the European part of Russia. Such ideas might provide a basis for U.S.-Russian or NATO-Russian cooperation on missile defense.

11. Looking to the Future

Preparing for the Next Round

The next round of formal U.S.-Russian negotiations will not begin until New START has been ratified by both sides and enters into force. That means formal negotiations could not begin until sometime in 2011. Washington and Moscow might, however, conduct consultations now with a view to preparing the way for those negotiations.[55]

The sides could, for example, discuss their respective concepts of deterrence and strategic stability—including the interrelationship between strategic offense and missile defense and the impact of long-range, conventionally-armed precision guided weapons—with the goals of promoting transparency and exploring where the sides' views converge and the implications of their views for future nuclear arms reductions. To the extent that the sides could develop a more common understanding on these concepts, it might facilitate formal negotiations once they begin. This discussion might address questions regarding the implications for strategic stability of long-range, conventional precision-guided weapons. This could serve as a venue for hearing out—and possibly allaying—Russian concerns that might otherwise hinder reaching an agreement. The sides might also discuss possible steps to reduce the operational readiness of deployed nuclear forces and consider how these might affect the nuclear arms reductions process.

Given the possibility that non-strategic and non-deployed strategic nuclear weapons may be added to the negotiating agenda, the sides might discuss now how they define and categorize different types of nuclear warheads. Developing a common method of categorizing nuclear weapons could prove useful once formal negotiations begin.

The sides might also disclose to one another the total number of nuclear weapons in their nuclear arsenals, perhaps broken down into four categories: deployed strategic nuclear warheads, non-deployed strategic nuclear warheads, non-strategic nuclear warheads and nuclear warheads awaiting dismantlement. Another possibility would be to categorize the weapons into two groups: strategic nuclear warheads on deployed ICBMs and SLBMs, and all other nuclear warheads. Exchanging data on these categories before the beginning of negotiations would allow the sides to begin assessing the data against information that they have collected via national technical means of verification and other sources. That might increase their confidence in numbers declared subsequently in a formal data exchange. It could also facilitate better-informed proposals once negotiations begin.

Washington and Moscow could discuss concepts for monitoring data and limits on non-deployed strategic nuclear warheads and non-strategic nuclear warheads. These would entail more intrusive verification requirements than limits on deployed strategic weapons. Given that reaching agreement on verification measures can take much of the time in a strategic arms negotiation, such discussions could prove useful in subsequent negotiations.

Finally, at some point, Washington and/or Moscow will insist that third-country forces be included in

the negotiating process or addressed in some way. The sides might discuss what would be the threshold below which they would not be prepared to reduce their deployed strategic warheads (and perhaps other types of nuclear weapons) without involving third countries.

Not all of these consultations might prove successful or fruitful. But they could give Washington and Moscow a head-start at defining—and perhaps resolving—issues that they will have to deal with once a formal negotiation begins.

Finally, it would make sense for Washington to launch a serious dialogue with Russia on missile defense transparency and possible cooperation, either as a U.S.-Russia or NATO-Russia endeavor, in the missile defense area. This offers the best path to defusing missile defense as an obstacle to the next round of nuclear arms reductions.

Elements of a Possible U.S. Negotiating Position

When U.S. and Russian negotiators sit down for formal talks on a follow-on to the New START Treaty, assuming that New START is ratified and enters into force, the U.S. goal should be one more round of purely U.S.-Russian arms reductions, putting off the many complications that bringing third countries into the mix would entail.

The U.S. government might consider the following elements of a position for a New START follow-on negotiation. The numerical limits:

- A limit on all nuclear warheads other than those retired and in the queue for dismantlement of no more than 2,500 per side. This would capture deployed strategic warheads, non-strategic nuclear weapons and non-deployed strategic warheads.

- Within the overall limit of 2,500 warheads, a sublimit of no more than 1,000 deployed strategic warheads per side.

- A limit of no more than 700 deployed ICBMs, SLBMs and heavy bombers equipped for nuclear armaments per side, and

- A limit of no more than 800 deployed and non-deployed ICBM and SLBM launchers and heavy bombers equipped for nuclear armaments per side.

The effect of these limits would be to reduce each side's deployed strategic warheads to 1,000—from the New START limit of 1,550—and to cap the number of non-strategic nuclear weapons and non-deployed strategic warheads at 1,500. (Actually, a side could deploy more in these categories if it chose to reduce its deployed strategic warheads to a level below 1,000.) The warhead limit and sublimit would allow each side the freedom to choose between non-strategic nuclear weapons and non-deployed strategic warheads; Russia might favor more of the former, while the United States would prefer the latter.

In the context of an agreement that addresses other U.S. concerns, the United States might consider accepting lower limits, for example, 600 deployed strategic delivery vehicles and 700 deployed and non-deployed launchers, vice the 700 and 800 limits in New START. Keeping the limits on deployed strategic delivery vehicles at 700 and on deployed and non-deployed launchers at 800 would allow the sides to spread a smaller number of warheads on the same number of strategic delivery vehicles, and move toward less heavily MIRVed missile systems in a manner that would produce a more stabilizing force structure. The Russians, however, are unlikely to take advantage of this flexibility. Instead, they are likely to press for reductions in strategic delivery vehicles, in large part because their post-New START force will be significantly below 700.

As for counting rules, the new agreement should apply the same counting rules as in New START for counting deployed strategic warheads on strategic ballistic missiles (actual count, including conventional as well as nuclear warheads), deployed strategic delivery vehicles (actual count) and

deployed and non-deployed strategic launchers (actual count). Washington should consider changing the bomber weapon counting rule; while some discount for bomber weapons compared to strategic ballistic missile warheads is justified, the U.S. government should propose that the sides attribute a number other than one, say three-four, to each deployed heavy bomber. This would maintain the notion of a discount but would reduce the amount of the discount. (The alternative would be to move toward an actual count rule for bomber weapons under which each side would declare—with the declaration subject to inspection—the number of ALCMs and bombs deployed at an air base where nuclear-capable heavy bombers were deployed, and that would be the number attributed to those bombers.)

Non-strategic and non-deployed strategic warheads would be counted on an actual count basis. Each side would declare to the other the number of weapons at each declared nuclear weapons storage site. When an inspection team arrived at a storage site, it would be informed of the number of weapons in each storage bunker, bay or chamber at the site and could choose one or more for inspection. Any transit of non-strategic nuclear weapons or non-deployed strategic warheads outside of a declared storage site would have to be pre-notified; thus, the detection of any such weapons outside a declared storage site not pre-notified would be a violation of the treaty.

The verification measures for the new agreement should build on those in New START, particularly those for deployed strategic delivery systems and strategic warheads, with additional provisions for monitoring weapons levels at declared centralized storage areas.

The result would be a two-tiered verification mechanism, in which the sides would have confidence in their ability to monitor limits on deployed strategic systems and warheads, but the monitoring provisions for constraints on non-strategic nuclear weapons and non-deployed strategic warheads would be less rigorous. It is unlikely that the intelligence community would be able to report significant confidence in its ability to monitor the limits on non-strategic and non-deployed warheads. But given the still high number of deployed strategic warheads—1,000 on each side—that uncertainty should be acceptable. (Having reductions in and limits on Russian tactical nuclear warheads with some uncertainty is preferable to leaving the large Russian tactical stockpile unconstrained and with no monitoring provisions.) The sides could begin to build experience and expertise in monitoring non-deployed weapons that would prove important for designing later verification regimes.

In exchange for Russian acceptance of other aspects of the U.S. proposal, the U.S. government, in consultation with NATO, might consider the likely Russian demand that all nuclear weapons be deployed on national territory. This would require the withdrawal of the 200 B-61 bombs reportedly deployed at NATO bases in Europe. Such a withdrawal would take place in the context of an agreement that would require—albeit with an imperfect monitoring regime—that the Russians eliminate a large number of tactical nuclear weapons and locate remaining weapons at centralized storage sites, away from NATO borders.

An agreement along these lines would be an important step building on New START. While the reduction in deployed strategic warheads—from 1,550 to 1,000—might not be as dramatic as some would like, that would be compensated for by the fact that the United States and Russia would each be limited to no more than 2,500 total nuclear warheads. This would represent a 50 percent reduction from the total of U.S. nuclear weapons as of September 2009, and a greater percentage reduction on the Russian side.

The sides would then be situated for another possible round of negotiations, in which they could consider further U.S.-Russian cuts and broadening the nuclear arms reduction process to include third countries, either by multilateralizing the negotiating process or by conditioning any further U.S. and Russian reductions on numerical constraints on third-country forces. If those countries chose not to reduce their forces, Washington and Moscow would

be positioned so that those third countries were the ones responsible for holding up the nuclear arms reduction process.

As for missile defense, Washington should seek to engage Moscow on missile defense cooperation in a separate channel. Hopefully, the advent of genuine missile defense cooperation would assuage Russian concerns, so that they do not insist upon missile defense constraints in the context of the new strategic arms reduction agreement.

The approach described above would be a logical follow-on to the New START Treaty. It would bring all U.S. and Russian nuclear weapons into the mix, for the first time ever, and mean a significant reduction, both in total nuclear weapons and deployed strategic warheads. It would allow the United States to maintain a robust strategic nuclear deterrent. Given the new subjects to be addressed, however, the next round of negotiations will prove significantly more complex than the negotiations that produced the New START Treaty—and will take considerably more time.

Endnotes

[1] See Steven Pifer, "New START: Good News for U.S. Security," *Arms Control Today,* May 2010, vol. 40, no. 4, pp. 8-14 and Steven Pifer, "New START and U.S. National Security," written statement prepared for the Senate Armed Services Committee, July 27, 2010 for descriptions of the New START Treaty and why it is in the U.S. interest.

[2] When used in the phrase "tactical nuclear weapon," "weapon" should be read the same as "warhead," i.e., it refers to the nuclear explosive device, not the delivery system (such as a tactical aircraft or short-range surface-to-surface missile).

[3] Weapons retired and in the queue for dismantlement could be addressed separately, perhaps by constraining them to certain declared storage locations and requiring that their numbers be declared, with regular updates.

[4] The White House, Office of the Press Secretary, "Joint Statement by President Dmitry A. Medvedev of the Russian Federation and President Barack Obama of the United States of America," London, April 1, 2009.

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

[6] See the White House, Office of the Press Secretary, "Joint Understanding," July 8, 2009 for the full set of parameters agreed by the presidents for the negotiation on New START.

[7] Deployed ICBMs are ICBMs in missile silos at ICBM fields and ICBMs on mobile ICBM launchers at ICBM bases; deployed SLBMs are SLBMs in missile tubes on ballistic missile submarines; and deployed heavy bombers equipped for nuclear armaments are such bombers at air bases.

[8] The treaty counts the actual number of warheads on ICBMs and SLBMs under the 1,550 limit. When inspections are carried out at ICBM fields or ballistic missile submarine bases, the inspected side must declare the number of warheads on each deployed strategic ballistic missile at that field or base, and the inspecting side can choose a missile for inspection to confirm the number of warheads. The treaty attributes one warhead to each deployed heavy bomber equipped for nuclear armaments, so each deployed heavy bomber counts as one warhead under the 1,550 limit.

[9] Non-deployed ICBM or SLBM launchers are ICBM silos that do not contain ICBMs or ballistic missile submarine launch tubes that do not contain SLBMs. Non-deployed launchers must be declared and are subject to inspection.

[10] The difference in attributed numbers for ALCM-carrying bombers reflected the larger capacity of U.S. bombers. START I applied this counting rule to the first 150 bombers equipped for ALCMs on the U.S. side and the first 180 bombers equipped for ALCMs on the Russian side. Additional heavy bombers equipped for ALCMs beyond those levels were to be attributed with the maximum number of ALCMs for which bombers of that type were equipped.

[11] For many years dating back to the mid-1970s, U.S. arms control efforts sought particular limits on MIRVed ICBMs. This was because they were seen as destabilizing: due to their accuracy, ICBMs could threaten the other side's ICBMs in their silos, and using one or two warheads to destroy a MIRVed ICBM in its silo could mean the elimination of three-ten warheads. The START II Treaty—which was signed in 1993 but never entered into force—would have banned all MIRVed ICBMs. In concluding the SORT Treaty in 2002, however, the Bush administration abandoned particular limits on MIRVed ICBMs. Senior USG officials testified during the SORT ratification hearings that, given the political changes between Washington and Moscow, they were no longer concerned about Russian MIRVed ICBMs.

[12] Washington has been considering a plan—known as "Prompt Global Strike"—to put conventional warheads on a small number of strategic ballistic missiles, which would give the United States the capability to deliver a precision-guided conventional warhead quickly to targets at great distances. Russia so far does not appear to be developing such a capability.

[13] Neither the United States nor Russia normally maintains nuclear weapons on heavy bombers. Under SORT, the United States counted against the 2,200 warhead limit bomber weapons deployed at heavy bomber air bases, while some experts believe that Russia did not count any bomber weapons as deployed.

[14] Department of State Fact Sheet, "START Aggregate Numbers of Strategic Offensive Arms (As of July 1, 2009, as compiled from individual data submissions of the Parties)."

[15] Department of State, "Annual Report on the Implementation of the Moscow Treaty 2010," <http://www.state.gov/documents/organization/141641.pdf>.

[16] The START I counting rules overstated the total numbers of U.S. and Russian strategic launchers and strategic warheads in 2009 for three reasons. First, a number of the ICBM silos and SLBM tubes were empty but, because the silos and tubes had not been eliminated according to START I procedures, they still counted as carrying deployed ICBMs and SLBMs, with their attributed warheads. Second, four U.S. Trident submarines had been converted to carry conventional SLCMs instead of Trident SLBMs, and U.S. B-1 bombers had been converted to carry conventional weapons only, but these systems continued to count as strategic nuclear delivery vehicles under START I rules. Third, most U.S. ICBMs and SLBMs had been downloaded to carry fewer warheads than the number with which they were attributed, but START I counted those missiles with their attributed number of warheads.

[17] Robert S. Norris and Hans M. Kristensen, "Nuclear Notebook: Russian Nuclear Forces, 2010," Bulletin of the Atomic Scientists, January/February 2010, pp. 74-81.

[18] This table assumes that the United States chooses to keep 420 deployed Minuteman III ICBMs, which will require that deployed U.S. nuclear-capable bombers be reduced to 40. If the Department of Defense were to choose to keep more than 40 bombers (it has said it may keep up to 60), it would have to reduce one deployed Minuteman III for each bomber over 40.

[19] This table is based on calculations by Pavel Podvig, Russian Strategic Nuclear Forces, "New START Treaty in Numbers," <russianforces.org/blog/2010/03/new_start_treaty_in_numbers.shtml>. A different calculation provided to the author by Hans M. Kristensen in July 2010 projected a total of 403 Russian deployed ICBMs, SLBMs and heavy bombers attributed with 1,349 warheads under New START. Some Defense Department officials question whether the Russians would reduce their deployed strategic weapons so low, noting that the Russians originally proposed a strategic warhead limit of 1,675 and did not accept the U.S.-proposed limit of 1,500, agreeing in the end to a limit of 1,550. The U.S. government has not produced an unclassified estimate of the Russian strategic nuclear force structure under New START.

[20] For a discussion of U.S. nuclear war plans, see Hans M. Kristensen, "Obama and the Nuclear War Plan," Federation of American Scientists Issue Brief, February 2010, <http://www.fas.org/blog/ssp/2010/02/warplan.php>.

[21] The White House, Office of the Press Secretary, "Remarks by President Obama and President Medvedev of Russia at New START Treaty Signing Ceremony and Press Conference," April 8, 2010, <www.whitehouse.gov/the-press-office/remarks-president-obama-and-president-medvedev-russia-new-start-treaty-signing-cere>.

[22] Alexei Arbatov assessed that the USSR possessed 6,700 warheads designated for ground forces, 7,000 for tactical air forces, 5,000 naval warheads, and 3,000 ABM and air defense weapons. See "Deep Cuts and De-alerting: A Russian Perspective" and p. 319 of Appendix A in Harold A. Feiveson, etal. *The Nuclear Turning Point: A Blueprint for Deep Cuts and De-Alerting of Nuclear Weapons* (Washington, D.C.: The Brookings Institution, 1999).

[23] This number comes from Secretary of Defense Clark Clifford, quoted in M. Leitenberg, "Background Materials in Tactical Nuclear Weapons (Primarily in the European Context)," in Stockholm International Peace Research Institute, *Tactical Nuclear Weapons: European Perspectives* (London: Taylor and Francis Ltd., 1978), p. 16.

[24] Oliver Meier, "Belgium, Germany Question U.S. Tactical Nuclear Weapons in Europe," *Arms Control Today*, vol. 35, no. 5, June 2005, <armscontrol.org/print/1818>.

[25] "America's Strategic Posture," The Final Report of the Congressional Commission on the Strategic Posture of the United States, 2009, <media.usip.org/reports/strat_posture_report.pdf>.

[26] Independent Estimates of Russian Tactical Nuclear Weapons

Category of Warhead	Handler and Kristensen for SIPRI (2002)	Verkhovtsev (2007)	Norris and Krisentsen for the NRDC (2009)
Ground Forces	0	0	0
Air Forces	1,540	3,500	650
Navy	640	1,200	700
ABM and Air Defenses	1,200	1,660	700
Total	3,380	6,360	2,050

Sources: Hans Kristensen and Joshua Handler, "Appendix 10A. Tables of Nuclear Forces." *Non-proliferation, Arms Control, Disarmament. SIPRI Yearbook*, 2002; General Vladimir Verkhovtsev (Nikolai Poroskov, "Takticheskii Yadernyi Kozyr" [A Tactical Nuclear Ace], Vremya Novosti, September 7, 2007 (Verkhovtsev claims that Russia has implemented its 1991 promise to cut tactical warheads in its air defense force by 60%, its air forces by 50%, its naval forces by one-third, and ground forces completely); Robert Norris and Hans Kristensen, "Nuclear Notebook," *Bulletin of the Atomic Scientists,* May/June 2009.

[27] See Department of Defense "Nuclear Posture Review Report," 2010, <www.defense.gov/npr/docs/2010%20nuclear%20posture%20review%20report.pdf>.

[28] Robert S. Norris and Hans M. Kristensen, "Nuclear Notebook: U.S. Nuclear Forces, 2009," Bulletin of the Atomic Scientists, March/April 2009, <http://www.thebulletin.org/files/065002008.pdf>.

[29] Though neither the White Paper nor the military doctrine explicitly mention the role of Russian tactical nuclear weapons, the White Paper elaborates on a "restructuring of Russian military planning…including a change of the Russian nuclear strategy" if NATO's current "offensive" military doctrine is not changed. See Gunnar Arbman and Charles Thornton, "Russia's Tactical Nuclear Weapons, Part II: Technical Issues and Policy Recommendations," Swedish Defence Research Agency user report, February, 2005, <http://www.foi.se/upload/english/reports/foi-russias-tactical-nuclear-w2.pdf>.

[30] The February 5, 2010 Military Doctrine announced that Russia would only consider using nuclear weapons when Russia's existence was threatened rather than the threshold established in the previous doctrine: when situations arose that were crucial to protecting Russia's national security interests. For a comparison between Russia's 2000 Military Doctrine and the newly released 2010 Military Doctrine, see Nikolai Sokov, "The New, 2010 Russian Military Doctrine: The Nuclear Angle," James Martin Center for Nonproliferation Studies, February 5, 2010, <http://cns.miis.edu/stories/100205_russian_nuclear_doctrine.htm>.

[31] See Steven Pifer, Richard C. Bush, Vanda Felbab-Brown, Martin S. Indyk, Michael O'Hanlon and Kenneth Pollack, "U.S. Nuclear and Extended Deterrence: Considerations and Challenges," The Brookings Institution, Arms Control Series Paper No. 3, May 2010, pp. 19-29 for a discussion of the factors that could affect the U.S. nuclear presence in Europe.

[32] "U.S. Signals its Nuclear Arms May Stay in Europe for Now," Reuters, April 22, 2010, <www.reuters.com/article/idUSTRE63L54Q20100422>.

[33] Sergey Lavrov, "START Treaty in the Global Security Matrix: The Political Dimension," Mezhdunarodnaya Zhizn, No. 7, July 2010, <http://www.indonesia.mid.ru/press/188_e.html>.

[34] Its predecessor, the Clinton administration, conceived the idea of maintaining non-deployed warheads as a hedge, though it was never implemented, in part because the START II Treaty never entered into force.

[35] Sergey Rogov, Director of the U.S. and Canada Institute, has suggested an approach along these lines in discussions with the author and others.

[36] U.S. Navy Fact File, "Tomahawk Cruise Missile," last updated April 23, 2010, <http://www.navy.mil/navydata/fact_display.asp?cid=2200&tid=1300&ct=2>.

[37] Robert S. Norris and Hans M. Kristensen, "Nuclear Notebook: Worldwide Deployments of Nuclear Weapons, 2009," Bulletin of the Atomic Scientists, November/December 2009, vol. 65, no. 6, pp. 86-98, <http://thebulletin.metapress.com/content/xm38g50653435657/fulltext.pdf>. Norris and Kristensen use a counting method that counts compounds as single sites rather than the method employed by both the Defense Department's Threat Reduction Program and the National Nuclear Security Administration, which count individually fenced storage bunkers as independent sites. The 2000 Threat Reduction Program statement concluded that 123 storage sites existed, while the NNSA's recent estimate was 73.

[38] While the collocation of civilian and military buildings or non-nuclear and nuclear weapons at the same facility complicates potential inspections as countries wish to protect sensitive information, this hurdle is likely surmountable.

[39] See "Krasnoyarsk-26/Zheleznogorsk Mining and Chemical Combine [MCA] N 56°22' E 93°41'," GlobalSecurity.org, <http://www.globalsecurity.org/wmd/world/russia/krasnoyarsk-26_nuc.htm>.

[40] See Robert S. Norris and Hans M. Kristensen, "Nuclear Notebook: Worldwide Deployments of Nuclear Weapons, 2009," Bulletin of the Atomic Scientists for the locations of U.S. nuclear weapons. The weapons storage vaults employed in Europe are located in the floors of protected aircraft shelters. The various components of the vaults are designed to be mechanically elevated to allow for access to the weapons, or conversely to be lowered into the floor for security or protective purposes. For more detail, see Hans M. Kristensen, *U.S. Nuclear Weapons in Europe: A Review of Post-Cold War Policy, Force Levels, and War Planning* by Hans Kristensen, National Resources Defense Council, February 2005, <www.nrdc.org/nuclear/euro/euro.pdf>.

[41] U.S. negotiators might consider proposing some form of challenge inspections outside of the declared storage areas, though securing Russian agreement would be very difficult. Some in the U.S. military as well might not be enthusiastic about challenge inspections, if for no other reason than their possible impact on day-to-day operational practices.

[42] The British draw their Trident D-5 SLBMs from a common pool with the U.S. Navy, though they provide their own warheads. New START permits this program of cooperation; any follow-on treaty would have to protect it as well.

[43] Gordon Brown, "Speech on Nuclear Energy and Proliferation," 17 March 2009," available at <webarchive.nationalarchives.gov.uk/+/number10.gov.uk/news/speeches-and-transcripts/2009/03/speech-on-nuclear-energy-and-proliferation-18631>.

[44] CNN World, "Britain Discloses Full Nuclear Arsenal," May 26, 2020, <http://articles.cnn.com/2010-05-26/world/britain.nuclear.arsenal_1_nuclear-arsenal-ballistic-missile-submarines-operational-warheads?_s=PM:WORLD>.

[45] The 2006 White Paper, released by the government led by Prime Minister Tony Blair, announced continued adherence to a submarine-based system of deterrence, plans for a new class of submarines, and the possibility of retiring one of the four in the fleet as part of the UK's "minimum nuclear deterrent."

[46] "U.K. to Reduce Nuclear Warhead Numbers," *Global Security Newswire*, October 20, 2010, <http://gsn.nti.org/gsn/nw_20101020_1151.php>.

[47] A more detailed breakdown of the French nuclear arsenal is available in Robert Norris and Hans Kristensen, "Nuclear Notebook: French Nuclear Forces, 2008," Bulletin of the Atomic Scientists, September/October 2008, vol. 64, no. 4, pp. 52-54, <thebulletin.metapress.com/content/k01h5q0wg50353k5/fulltext.pdf>.

[48] French President Nicolas Sarkozy revealed in a 2008 speech at Cherbourg naval station that "with respect to the airborne component, the number of nuclear weapons, missiles and aircraft will be reduced by one-third" with the intention of reaching a ceiling of 300 warheads. For the full text of the speech, see "Presentation of Le Terrible in Cherbourg, speech by French President Nicolas Sarkozy," Carnegie Endowment for International Peace, March 21, 2008, <www.carnegieendowment.org/publications/index.cfm?fa=view&id=20001&prog=zgp&proj=znpp>.

[49] The Department of Defense issues annual reports to Congress on China's military capabilities. These reports track the testing and deployment of new delivery systems for both strategic and non-strategic nuclear weapons. Department of Defense, "The Annual Report to Congress: Military Power of the People's Republic, 2009," <www.defense.gov/pubs/pdfs/China_Military_Power_Report_2009.pdf>.

[50] For more information on how these estimates were obtained and the types of delivery systems used by the Chinese, see Robert Norris and Hans Kristensen, "Nuclear Notebook: Chinese Nuclear Forces, 2008," Bulletin of the Atomic Scientists, July/August 2008, pp. 42-45, <thebulletin.metapress.com/content/25094v7235832574/fulltext.pdf>.

[51] See the Ministry of Foreign Affairs of the People's Republic of China, "Fact Sheet: China: Nuclear Disarmament and Reduction," April 27, 2004, <www.fmprc.gov.cn/eng/wjb/zzjg/jks/cjjk/2622/t93539.htm>.

[52] For the complete official Chinese statement, see the Central People's Government of the People's Republic of China, "China's National Defense in 2008," <www.gov.cn/english/official/2009-01/20/content_1210227_16.htm>.

[53] Such consultations made little headway during the Bush administration, in part because the Russians apparently doubted that the United States would make such a heavy investment in missile defense unless such a system was directed against Russia.

[54] See Madeleine Albright, Strobe Talbott, Igor Ivanov and Alexander Dynkin, "Next Steps on U.S-Russian Nuclear Negotiations and Non-Proliferation," Brookings/IMEMO paper, <http://www.brookings.edu/~/media/Files/rc/papers/2010/10_nonproliferation_albright_talbott/10_nonproliferation_albright_talbott.pdf>.

[55] These ideas draw from "Next Steps on U.S.-Russian Nuclear Negotiations and Non-Proliferation."

Acronyms

ABM	Anti-Ballistic Missile
AFB	Air Force Base
ALCM	Air-Launched Cruise Missile
CFE	Conventional Armed Forces in Europe
ICBM	Intercontinental Ballistic Missile
INF	Intermediate Range Nuclear Forces
MIRV	Multiple Independently Targetable Reentry Vehicle
NPT	Non-Proliferation Treaty
NSNW	Non-Strategic Nuclear Weapon
SLBM	Submarine-Launched Ballistic Missile
SLCM	Sea-Launched Cruise Missile
SSBN	Ballistic Missile Submarine
SORT	Strategic Offensive Reductions Treaty
START	Strategic Arms Reduction Treaty
TLAM/N	Tomahawk Land-Attack Missile/Nuclear

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#1 *Resetting U.S.-Russian Leadership on Nuclear Arms Reductions and Non-Proliferation*, by Steven Pifer, Joseph Cirincione and Clifford Gaddy, January 2010, <http://www.brookings.edu/~/media/Files/rc/papers/2010/01_us_russia_nuclear_pifer/01_us_russia_nuclear_pifer.pdf>.

#2 *Salvaging the Conventional Armed Forces in Europe Treaty Regime: Options for Washington*, by Anne Witkowsky, Sherman Garnett and Jeff McCausland, March 2010, <http://www.brookings.edu/~/media/Files/rc/papers/2010/03_armed_forces_europe_treaty/03_armed_forces_europe_treaty.pdf>.

#3 *U.S. Nuclear and Extended Deterrence: Considerations and Challenges*, by Steven Pifer, Richard C. Bush, Vanda Felbab-Brown, Martin S. Indyk, Michael O'Hanlon and Kenneth M. Pollack, May 2010, <http://www.brookings.edu/~/media/Files/rc/papers/2010/06_nuclear_deterrence/06_nuclear_deterrence.pdf>.

About the Author

Steven Pifer is a senior fellow in the Center on the United States and Europe and director of the Arms Control Initiative at the Brookings Institution. A retired Foreign Service officer, he served more than 25 years with the Department of State, including as deputy assistant secretary of state with responsibility for Russia and Ukraine, ambassador to Ukraine, and special assistant to the president and National Security Council senior director for Russia, Ukraine and Eurasia. He also served at the U.S. embassies in London, Moscow and Warsaw, as well as in Geneva with the U.S. delegation to the negotiations on intermediate-range nuclear forces. He has authored numerous policy reports, academic articles and opinion pieces on arms control, Ukraine and Russia, and frequently comments on these issues in the media.

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1775 Massachusetts Ave., NW
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