1. Further Reductions in Nuclear Forces

David Holloway

Summary

The United States and Russia have about 95 percent of all nuclear warheads. There is scope for further immediate reductions. Recent doctrinal statements by the United States and Russia suggest (i) that it should be possible to make substantial reductions in strategic nuclear weapons, and (ii) that there is no reason why their strategic nuclear forces should be "operationally deployed."[1]

The paper sets out four stages in the reduction of nuclear weapons to very low levels. Three criteria are used to assess those stages: strategic stability; monitoring and verification; contribution to the goal of eliminating nuclear weapons.

The reductions outlined here start with a feasible option (stage one) and end with a conceivable one (stage four). In stage one the United States and Russia could reduce the number of operationally deployed strategic nuclear warheads to 1000. That number could be inserted into the Moscow Treaty in place of the current target of 1700–

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1. I follow convention by using "warhead" to include bombs as well as missile warheads, and "weapon" to include the delivery vehicle as well as the warhead.

2200. The parts of the START Treaty that are relevant to verification and monitoring should be maintained in one form or another beyond December 2009. An additional undefined number of warheads would remain in a responsive force.

In stage two the United States and Russia would each retain 500 operationally deployed strategic nuclear warheads plus 500 more in the responsive force. Stage three would be more radical, limiting the two countries to a strategic nuclear force with 500 warheads, all in a reserve force with zero operationally deployed.

Sooner rather than later, the other nuclear powers will need to be brought into the process of disarmament. Three commitments will be required from them: not to increase their nuclear forces; to agree to greater transparency; and not to have their nuclear forces operationally deployed.

Given the diminishing distinction between strategic and non-strategic weapons as numbers decrease, a conceivable stage four would be a configuration in which no state in the world has more than 500 (or 200 in a variant) nuclear warheads of any type with zero operationally deployed. As reductions are made, strategic stability becomes more complicated, while verification and monitoring become more difficult.

Reductions are complementary to other approaches; compared with de-alerting, they have the advantage, as long as the warheads are disassembled, of irreversibility. Missile defenses could be accommodated within the process of disarmament only if they were pursued cooperatively.

Some thoughts are offered on the transition to a world with no nuclear weapons.

Introduction

The number of nuclear warheads in the world reached its peak of about 70,000 in 1986, the year of the Reykjavik summit meeting. There has been a significant reduction since then, but the current total

of over 20,000 is still high. Much remains to be done if the world is to be rid of nuclear weapons.

Nuclear weapons are distributed very unevenly. No government publishes detailed information about the numbers of nuclear warheads it possesses. According to careful estimates—which are, however, estimates—Russia now has about 15,000 nuclear warheads; the United States, 10,000; France, 350; and Britain and China about 200 each. The other nuclear weapons states—Israel, India, Pakistan, and North Korea—have smaller stockpiles, amounting to a total of about 200–350 warheads.[2]

These figures apparently include all nuclear warheads, those intended for deployment on long-range as well as short-range delivery vehicles. Not all of these nuclear warheads are deployed with armed forces. Some indeed are due to be disassembled in the coming years, but plans for disassembly have not been made public.

This paper takes as given—and desirable—the goal of a world without nuclear weapons. In that context it asks how the nuclear forces of all states that possess them could be substantially reduced. It looks first at the reduction of the strategic nuclear weapons of the United States and Russia and then asks how reductions in nuclear forces might be phased to involve all states that possess nuclear weapons. To what extent, and when, will these reductions require coordinated action and/or negotiated agreements? What arrangements for monitoring and verification need to be created to support such reductions? Finally it considers the steps that need to be taken to move from substantial reductions to the elimination of nuclear weapons.

2. I am much indebted to the work of Robert S. Norris and Hans M. Kristensen on nuclear stockpiles published in the Nuclear Notebook in the *Bulletin of the Atomic Scientists*. The sources for the figures in this paragraph are as follows: *Bulletin of the Atomic Scientists*, March/April 2007, p. 61 for Russia; *Bulletin*, January/February 2007, p. 79 for the United States; and *Bulletin*, July/August 2006, pp. 65–66 for the other countries. Unless otherwise stated I have relied on the Nuclear Notebook for the numbers in this paper.

Current Plans for Reductions

The United States and Russia are committed to reducing the number of their strategic nuclear warheads to 1700–2200 by December 31, 2012, under the terms of the Strategic Offensive Reductions Treaty (SORT), which was signed in Moscow by Presidents Bush and Putin in May 2002.[3] On July 3, 2007, Secretary of State Rice and Foreign Minister Lavrov issued a joint statement: "The United States and Russia reiterate their intention to carry out strategic offensive reductions to the lowest possible level consistent with their national security requirements and alliance commitments."[4] This may—or may not—imply that further reductions are to be expected once the Moscow Treaty targets have been reached.

In its 2001 Nuclear Posture Review, the U.S. Department of Defense drew a distinction between "operationally deployed nuclear forces" and "responsive nuclear forces." It defined the former as those "required to meet the U.S. defense goals in the context of immediate, and unexpected contingencies." In other words, "a sufficient number of forces must be available on short notice to counter known threats while preserving a small, additional margin in the event of a surprise development." "Responsive forces," on the other hand, are "intended to provide a capability to augment the operationally deployed force to meet potential contingencies." The responsive force—essentially a reserve force—is intended to enable the United States to increase the number of operationally deployed forces in a crisis. "A responsive force," according to the Nuclear Posture Review, "need not be available in a matter of days, but in weeks, months, or even years. For

3. Text accessed at www.state.gov/t/ac/trt/18016.htm#1. The Treaty refers to reductions in strategic nuclear warheads, but the United States made it clear that it would reduce only "operationally deployed" strategic nuclear warheads. The United States and Russia did not agree on a definition of "operationally deployed warheads," nor did Russia at the time of the Treaty make clear how it understood that category.

4. Joint Statement by U.S. Secretary of State Condoleezza Rice and Minister for Foreign Affairs of the Russian Federation Sergey Lavrov, July 3, 2007. Accessed at www.state.gov/r/pa/prs/ps/2007/87638.htm.

example, additional bombs could be brought out of the non-deployed stockpile in days or weeks. By contrast, adding additional weapons to the ICBM force could take as long as a year for a squadron in a wing."[5]

In the Moscow Treaty the United States made the commitment to reduce its "operationally deployed strategic nuclear warheads" to 1700–2200 by the end of 2012. In the course of the negotiations, it defined "operationally deployed strategic nuclear warheads" as:

> Reentry vehicles on ICBMs in their launchers, reentry vehicles on SLBMs in their launchers onboard submarines, and nuclear armaments loaded on heavy bombers or stored in weapons storage areas of heavy bomber bases. The United States also made clear that a small number of spare strategic nuclear warheads (including spare ICBM warheads) would be located at heavy bomber bases and that the United States would not consider these warheads to be operationally deployed strategic nuclear warheads.[6]

Secretary of State Powell pointed out in Senate hearings that "this is a departure from the way in which warheads are counted under the START Treaty, but one that more accurately represents the real number of warheads available for use immediately or within days."[7] The START Treaty contains counting rules that attribute specific numbers of warheads to each type of ICBM, SLBM, or heavy bomber, regardless of the actual number of warheads on the missile or bomber. These numbers may be different from both the actual capacity of the specific system and the number actually carried by the system.

Under the Moscow Treaty, a warhead is counted if it is mated

5. These quotations are taken from p. 17 of the Nuclear Posture Review submitted to Congress on December 31, 2001. Excerpts from the Review were made public. Accessed at www.globalsecurity.org/wmd/library/policy/dod/npr.htm.

6. Letter of Transmittal from President Bush to the Senate, June 20, 2002. Accessed at www.state.gov/t/ac/trt/18016.htm#2.

7. "A New Way of Doing Business," Secretary of State Colin Powell, statement prepared for delivery to the Senate Foreign Relations Committee, July 9, 2002. Accessed at www.acronym.org.uk/docs/0207/doc01.htm.

with a missile or loaded on a bomber or stored at a bomber site. According to Powell, the United States and Russia did not agree on a detailed definition of "operationally deployed strategic nuclear warheads" during the SORT negotiations, but Russia too is committed to the goal of reducing its strategic nuclear warheads to the level of 1700–2200 by December 2012. As further cuts are made, agreement will be needed on the precise definition of "operationally deployed" and "responsive" strategic nuclear warheads.

The Moscow Treaty does not make explicit reference to verification, but the verification regime of the START Treaty will remain in effect at least until December 2009, when the Treaty expires.[8] In his letter transmitting the Moscow Treaty to the U.S. Senate for ratification in July 2002, President Bush wrote:

> It is important for there to be sufficient openness so that the United States and Russia can each be confident that the other is fulfilling its reductions commitment. The Parties will use the comprehensive verification regime of the Treaty on the Reduction and Limitation of Strategic Offensive Arms (the "START Treaty") to provide the foundation for confidence, transparency, and predictability in further strategic offensive reductions.[9]

In July 2007 Secretary of State Rice and Foreign Minister Lavrov announced that they had "discussed development of a post-START arrangement to provide continuity and predictability regarding strategic offensive forces."[10]

8. The Moscow Treaty did, however, establish a Bilateral Implementation Commission, where issues relating to the implementation of the Treaty can be discussed. In their Joint Declaration of May 24, 2002, Presidents Bush and Putin established a Consultative Group for Strategic Security, which is not part of the Treaty, to serve as the principal mechanism through which mutual confidence could be strengthened, transparency enhanced, and information and plans shared. "Joint Declaration on the New Strategic Relationship, May 24, 2002." Accessed at www.state.gov/t/ac/trt/18016.htm#13.

9. Letter of Transmittal (note 6).

10. Joint Statement (note 4).

On July 1, 2007, according to information exchanged by the two countries under the terms of the START Treaty, the United States had 550 ICBMs, 432 SLBMs, and 243 heavy bombers, while Russia had 509 ICBMs, 288 SLBMs, and 78 heavy bombers. Under the START counting rules, the United States had 5914 strategic nuclear warheads and Russia had 4237.[11] According to the estimates of Norris and Kristensen, however, the real numbers for early 2007 were 5236 deployed strategic nuclear warheads (including 215 spares) for the United States, while Russia had 3340 deployed strategic warheads. These latter figures are based on the counting rule outlined by Powell in the statement quoted above.

The START counting rules make the Treaty easier to monitor because the number of deployed warheads is a function of the number of delivery vehicles, but those counting rules also open up the possibility of a discrepancy between the number of warheads counted and the number actually deployed. For that reason, the Powell rule is more appropriate for counting nuclear warheads as nuclear forces are reduced, since discrepancies between counted and deployed warheads are likely to have greater significance at lower levels of forces.

The Moscow Treaty is innovative in a number of ways. It focuses exclusively on warheads, rather than on launchers, as SALT did, or on launchers and warheads, as START did. It does not define subceilings for different categories of forces; each side can decide on the composition of its own strategic forces. The Treaty contains no limitations on responsive or inactive forces, even on those that could be made operational in a relatively short time. That is not a matter of great consequence at the levels stipulated in the Moscow Treaty, but it will become more significant when substantial reductions are considered.

The Moscow Treaty is conservative in its goals. A much more

11. U.S. Department of State, *Fact Sheet: START Aggregate Numbers of Strategic Offensive Arms* (July 1, 2007). Accessed at www.state.gov/documents/organization/93342.pdf.

radical approach is needed if the world is to be rid of nuclear weapons. Several options for substantial reductions are examined below. The United States and Russia between them possess about 95 percent of all nuclear weapons, so that is where reductions should start. These two countries could reduce their strategic forces substantially before needing to bring the other nuclear powers into the process of disarmament.

The Political and Doctrinal Context for Substantial Force Reductions

The end of the Cold War and the collapse of communist rule transformed the political and strategic relationship between the United States and Russia. Neither country now regards the other as posing a fundamental threat to its existence. In a Joint Statement issued on November 13, 2001, Presidents Bush and Putin declared: "The United States and Russia have overcome the legacy of the Cold War. Neither country regards the other as an enemy or threat."[12] Relations have worsened since then, but this deterioration does not presage a new cold war. There are serious conflicts of interest, but the fundamental enmity of the Cold War years is missing. An intentional nuclear war between the two countries is out of the question. As President Bush said on October 23, 2007, "Russia is not our enemy. . . . We no longer worry about a massive Soviet first strike."[13]

Neither country now regards the other as an imminent nuclear threat, or as the main source of nuclear danger. The 2001 U.S. Nuclear Posture Review declared that a nuclear strike contingency involving Russia "while plausible, is not expected."[14] In 2003 the Russian Min-

12. Joint Statement by President George W. Bush and President Vladimir V. Putin on a New Relationship Between the United States and Russia, November 11, 2001. Accessed at www.state.gov/t/ac/trt/18016.htm#6.

13. Speech to the National Defense University, October 23, 2007. Accessed at www.whitehouse.gov/news/releases/2007/10/20071023-3.html

14. Nuclear Posture Review (note 5), p. 17.

istry of Defense stated that global nuclear war and large-scale conventional wars with NATO or any other American-led coalition had been excluded from the category of likely conflicts for which the Armed Forces had to plan and prepare.[15]

Neither the United States nor Russia, however, is ready to dismiss completely the danger of a nuclear threat arising from the other in the future. According to the 2001 Nuclear Posture Review, "Russia's nuclear forces and programs . . . remain a concern. Russia faces many strategic problems around its periphery and its future course cannot be charted with certainty. U.S. planning must take this into account."[16] For their part, many Russians fear that the United States is seeking, and perhaps actually acquiring, the ability to deliver a disarming first strike against Russia.[17] As the current controversy over the deployment of elements of the U.S. missile defense system in Europe shows, Russia is determined to retain the capacity to retaliate in the event of a nuclear attack.

Both countries remain committed to the use of nuclear weapons for deterrence. The 2000 Military Doctrine of the Russian Federation, for example, states that Russia must possess nuclear forces capable of

15. Ministry of Defense of the Russian Federation, *Aktual'nye zadachi razvitiia vooruzhennykh sil rossiskoi federatsii* (Moscow, 2003), p. 8.

16. Nuclear Posture Review (note 5), p. 17.

17. Vladimir Dvorkin et al., "Iadernaia politika 'bol'shoi piaterki,'" in Aleksei Arbatov and Vladimir Dvorkin, eds., *Iadernoe oruzhie posle "kholodnoi voiny"* (Moscow: Moscow Carnegie Center, 2006), p. 47. See also Yegor Gaidar, "Nuclear Punditry Can Be a Dangerous Game," *Financial Times*, March 29, 2006. This was a response to an article in *Foreign Affairs* (March/April 2006) by Kier A. Lieber and Daryl. G. Press entitled "The Rise of Nuclear Primacy," which argued that the United States now stood on the verge of nuclear primacy and would soon—within ten years or so—be able to destroy Russian and Chinese nuclear arsenals with a first strike. The article caused considerable stir in Russia. Its basic thesis was dismissed by several prominent Russian specialists, including General Vladimir Dvorkin, former head of Central Research Institute No. 4 of the Ministry of Defense, which does research on strategic weapons and strategic weapons policy. For a discussion of these responses, see Nikolai Sokov, "Moscow Rejects U.S. Authors' Claim of U.S. First-Strike Capability," in *WMD Insights*, May 2006. Accessed at www.wmdinsights.com/I5/R1_MoscowRejects.htm.

inflicting assured destruction on an aggressor in any conditions.[18] The U.S. Department of Defense's 2001 Nuclear Posture Review refers to the:

> U.S. deterrence policy to hold at risk what opponents value, including their instruments of political control and military power, and to deny opponents their war aims. The types of targets to be held at risk for deterrence purposes include leadership and military capabilities, particularly WMD, military command facilities and other centers of control and infrastructure that support military forces.

This continuing commitment to deterrence is important, because deterrence has its own requirements, which need to be taken into account when considering reductions in strategic nuclear forces.

Both the United States and Russia see themselves as facing new nuclear threats for which deterrence is not necessarily the appropriate policy. The Bush administration, in its National Security Strategy of September 2002, claimed that deterrence could no longer play the role it had played in the Cold War and asserted its willingness to use force against "rogue states" and terrorist groups to prevent them from acquiring weapons of mass destruction, including nuclear weapons.[20] Russia too has begun to argue that deterrence is not an appropriate response to all threats and to stress the importance of using force preventively in certain circumstances. In the words of the 2006 Russian White Paper on Nonproliferation,

> For the foreseeable future, the greatest threat faced by Russia and other states in the area of nonproliferation will emanate from the

18. *Voennaia doktrina rossiskoi federatsii*, April 2000, Section II, point 17. Accessed at www.scrf.gov.ru/documents/33.html.

19. Nuclear Posture Review (note 5), p. 19. The United States now relies on both non-nuclear and nuclear weapons for "offensive deterrence." (Nuclear Posture Review (note 5), Foreword.) This affects the assessment of strategic balances in ways that might be important as the number of nuclear warheads is reduced, though conventional warheads are unlikely to pose a threat to hardened targets.

20. White House, *National Security Strategy of the United States of America*, September 17, 2002, p. 15. Accessed at www.whitehouse.gov/nsc/nss.html.

> possible use by terrorists of some type of WMD. While the value of the doctrine of deterrence will remain as it relates to countries with WMD capabilities, where terrorists are concerned it will obviously not apply.[21]

Nuclear deterrence remains an important element in the policies of both the United States and Russia, but it no longer enjoys the central position it occupied during the Cold War. In particular, neither country regards it as the most effective instrument for dealing with the most urgent nuclear threats.

This changed context suggests two conclusions. First, even within the framework of nuclear deterrence it should be possible for the two countries to make further substantial reductions in strategic nuclear forces. Nuclear deterrence today, in the context of U.S.-Russian relations, hardly requires "operationally deployed nuclear forces" consisting of thousands of warheads. Drell and Goodby argue that, if both Russia and the United States were to reduce the number of their strategic nuclear warheads to a total of 1000 (half operationally deployed and half in the responsive force), the United States would be able to keep at risk 200–300 Russian military and military-support targets, and that that would be sufficient for deterrence.[22] A similar point could be made about Russian policy vis-à-vis the United States.

Second, to the extent that the United States and Russia are both concerned about what might happen in the future rather than about the current relationship, there is no reason why their strategic nuclear forces should be "operationally deployed" rather than held in a responsive mode. The "Russian contingency" as portrayed in the 2001 US Nuclear Posture Review does not require that U.S. forces be "op-

21. *The Russian Federation and the Nonproliferation of Weapons of Mass Destruction*, June 2006, chapter 1. Accessed at cns.miis.edu/pubs/other/rusfed.htm.

22. Sidney D. Drell and James E. Goodby, *What Are Nuclear Weapons For? Recommendations for Restructuring U.S. Strategic Nuclear Forces*, revised edition (Washington, D.C.: Arms Control Association, 2007), pp. 14–18. Accessed at www.armscontrol.org/pdf/20071104_drell_goodby_07_new.pdf.

erationally deployed." Nor do Russian fears that the United States is aiming for a disarming first-strike capability make it necessary for Russian forces be "operationally deployed" at present, because such a capability, even if it is possible, would not appear suddenly and will not materialize in the near future.

Criteria for Assessing Reductions

The United States and Russia could each make substantial reductions in their strategic nuclear forces while still retaining an effective nuclear deterrent, the more so since mutual deterrence between them now serves as a hedge against a possible future danger rather than as protection against an immediate and pressing threat. Various options can be devised for substantial reductions in strategic nuclear forces, and some of these are considered below. By what criteria should these options be evaluated?

Criterion I: Strategic stability

In order to move to a world without nuclear weapons it will be necessary to restrict and ultimately to eliminate the role of nuclear weapons in national security policy. The question to ask, therefore, is not "What role should nuclear weapons play in national security policy?" but rather "Is there an irreducible core role that nuclear weapons will play, even as nuclear forces are being reduced?" The answer, implicit in the paper so far, is that, if there is such a role, it is deterrence of a nuclear attack. As we have seen, that position is reflected in official statements by the United States and Russia. The first criterion to apply, therefore, in evaluating reductions is that they should not upset strategic stability. A balance should be maintained that is stable in terms of classic deterrence theory: The new balance should not offer incentives for the use of nuclear weapons in a crisis; nor should the new balance create incentives to acquire more nuclear weapons in the hope of achieving some kind of superiority for one's self or out of fear that the other side will gain superiority. What this means in practice is that

each side should have survivable strategic forces that provide an assured capability to retaliate, under any circumstances, against an attacker. For the balance to be stable neither side should have the capability to destroy the other side's strategic forces in a first strike, and neither side should fear that the other side might be able to acquire such a capability. Each side needs to be confident that the other understands that it could not launch a nuclear strike without suffering retaliation. That is the first and most important criterion for assessing options within the framework of mutual deterrence. It is not essential that retaliation be immediate; the threat of delayed retaliation will be just as effective, as long as the potential aggressor is sure that retaliation will take place.

Strategic stability should not be viewed as a purely technical matter. The political context is crucial. Policymakers and planners have to make political assumptions as well as technical judgments. The level of destruction that a retaliatory strike needs to threaten, in order to deter, will vary according to political as well as military circumstances. The forces needed to deter a mortal enemy that has nuclear weapons are likely to be different from those needed to deter a country with which one has less hostile relations. (In the latter case the attacker is less likely to give his political goals a value that would outweigh the losses that even the smallest retaliatory nuclear strike could cause.) Mutual deterrence can thus exist at different levels of nuclear forces, and indeed it need not exist at all in relations between nuclear states, if those states have such good relations that war between them is inconceivable. There is no deterrence if neither side contemplates attacking or being attacked. The degree to which deterrence plays a role in relations among the nuclear powers can vary greatly over time; so too can the forces needed for deterrence.

The political context is relevant in other ways too. If policymakers and planners engage in worst-case planning, that may make stable deterrence at a low level of forces impossible. Worst-case planning was a common phenomenon during the Cold War, and there are two

current examples: the U.S. is building a missile defense system to counter an Iranian ICBM that does not exist, and the Russians are developing systems to penetrate or overwhelm elements of the U.S. missile defense system that have not yet been deployed. Furthermore, if strategic nuclear weapons are regarded as important symbols of power and status, as they were during the Cold War, then it may prove difficult to bring the development and deployment of new weapons under control, because even marginal gains by one side will be seen to require a response from the other, if only for symbolic reasons. The present political context is different from that of the Cold War, however, offering some hope that a stable balance can be achieved by the United States and Russia at lower levels of forces, especially if those lower levels are seen to be steps on the path to a world without nuclear weapons.

Criterion II: Monitoring and Verification

It is crucial that each side be able to monitor nuclear stockpiles and verify compliance with any agreement. This is important because deep reductions in nuclear forces will be possible only if each side is confident that the other is abiding by whatever agreement has been concluded. Confidence is important in two respects: operationally—each side needs to be sure the other cannot break out of an agreement in order to achieve a strategic advantage; and politically—each side needs to be sure of the good faith of the other in pursuing reductions.

The paper by Ray Juzaitis and John McLaughlin examines monitoring and verification in detail, but some comments are appropriate here.[23] [See Chapter 4.] There is variation in the degree to which nuclear warheads in different categories can be verified and monitored. There is a great deal of experience under the START Treaty with *deployed warheads* on both missiles and bombers. The problems and

23. My discussion of verification and monitoring in this paper relies very heavily on the advice of Edward Ifft, whose help I am very happy to acknowledge. [See Chapter 5.]

procedures are well understood. The procedures are good and would not need to change much for any level, including zero. Monitoring of *non-deployed warheads* would be much more difficult, and there might be opposition to even trying, but various methods could be adopted that would give some assurance about the number of warheads in a responsive force. One could require declarations of numbers and perhaps verify the data, but ultimately it might be difficult to ensure that absolutely no warheads had been concealed. Various attempts have been made, on both a bilateral and a multilateral basis, to develop mechanisms to ensure the transparency of *reductions in nuclear warheads and materials,* thereby making it possible to monitor the disassembly of nuclear warheads and to account for fissile material. One such effort was the Trilateral Initiative of the U.S., Russia, and the IAEA, launched in 1996. This went a long way to developing an international monitoring regime to verify permanent removals of both classified and unclassified weapons materials from the U.S. and Russian military programs. That initiative stalled some years ago over disputes about transparency, funding, and the length of time weapons material should be monitored by the IAEA, but it could be revived.[24]

Criterion III: Contribution to the Elimination of Nuclear Weapons

In the context of this project this is the most important criterion. Reductions have to be judged in terms of the degree to which they help pave the way to the elimination of nuclear weapons. The first two criteria could be met with forces at their current levels. The argument for a world without nuclear weapons does not rest primarily on anx-

24. An important source on all these issues is National Academy of Sciences' Committee on International Security and Arms Control, *Monitoring Nuclear Weapons and Nuclear-Explosive Materials: An Assessment of Methods and Capabilities* (Washington, D.C.: National Academies Press, 2005). On the Trilateral Initiative, see pp. 140–141. See also Nuclear Threat Initiative, "Monitoring Stockpiles." Accessed at www.nti.org/e_research/cnwm/monitoring/trilateral.asp.

ieties about the stability of the nuclear relationship between the United States and Russia. It springs rather from the judgment that a nuclear order based on discrimination—with some countries possessing nuclear weapons and others denied the right to have them—will not work. It is not only that there will be additional states wanting to acquire nuclear weapons of their own. The nuclear regime will not be legitimate in the eyes even of those states that do not wish to have nuclear weapons. They may be less willing to sustain and enforce a discriminatory nuclear regime than a regime in which nuclear weapons are prohibited altogether.

This is not a simple criterion to apply. Elimination of nuclear weapons would not mean a return to the world before nuclear weapons. We would be entering a post-nuclear weapons world in which the knowledge of how to make nuclear weapons would exist, as well as fissile materials and the industrial technologies for producing them. New understandings and institutions would be needed to control and manage this condition of nuclear latency. Nuclear latency is generally regarded as undesirable from the point of view of proliferation, because it means that a number of states that do not now possess nuclear weapons could acquire them relatively quickly. From the point of view of elimination, however, latency can be regarded as a good thing, if it means that states that now have nuclear weapons get rid of those weapons, even while retaining some capacity to rebuild them. By the time the ultimate elimination of nuclear weapons becomes a practical matter, a great deal of progress will have to have been made on the other measures being examined in this project—elimination of non-strategic nuclear weapons, controls over fissile materials, and internationalization of the fuel cycle, for example—in order to ensure that nuclear latency cannot easily be converted into deployed forces. A greater measure of transparency and predictability concerning nuclear activities will be needed, as well as new and agreed arrangements for dealing with the danger of non-compliance with the non-nuclear weapons regime.

The reduction of nuclear forces is one of the essential paths to a world without nuclear weapons. It is only by reducing nuclear forces that we can approach the goal of zero nuclear weapons. Another, complementary, approach to the elimination of nuclear weapons is to remove nuclear weapons from operational deployment and to maintain them in a responsive mode as nuclear forces are being reduced. This latter approach would not merely lessen the risk of accidental or unauthorized launch of nuclear weapons. It would also signal a willingness to reduce the salience of nuclear weapons in international politics.

The rest of this paper uses these three criteria to examine the stages by which nuclear forces might be reduced. There are other criteria that could be applied in assessing the stages of nuclear force reductions. One is whether the reductions in strategic nuclear weapons do in fact reduce the danger of accidental nuclear war; another is whether they reduce the danger that terrorists might gain control of nuclear weapons or fissile material. These are extremely important criteria, but they are not discussed here, mainly because reductions in nuclear forces that meet the three criteria above should also reduce the risk of nuclear war, while having fewer deployed warheads would make it possible to reduce the nuclear danger from terrorists by storing warheads more securely and moving them less frequently.

The stages outlined below focus on two key parameters: the total number of warheads and the distinction between operationally deployed and responsive forces. Two points should be noted, however, before considering these stages. First, it will be very difficult to verify the numbers of non-deployed warheads. It is much easier to verify the number of delivery vehicles that could carry those warheads. Limits on delivery vehicles will therefore be required alongside limits on warheads. Those limits would cover ICBM launchers, SLBM launchers, and heavy bombers. The two sides have extensive experience under the START Treaty of monitoring non-deployed missile launchers, non-deployed missiles, and non-deployed bombers. Limits on the

number of launchers and delivery vehicles would help to restrict the capacity of either side to break out of an agreement by reconstituting its forces rapidly.

The second is that the two categories—"operationally deployed" and "responsive"—contain within themselves further distinctions that are relevant to the process of disarmament. "Operationally deployed warheads" can be deployed in different states of alert. Many of the procedural and physical de-alerting measures outlined by Bruce Blair in his paper would not require removing the delivery systems from the category of "operationally deployed forces." [See Chapter 2.] Other measures discussed in Blair's paper—for example his Option 3—would automatically remove the strategic forces from the "operationally deployed" category to the responsive force. The responsive force itself—as was made clear above—can consist of delivery systems in various degrees of readiness, from those that could be made ready in a matter of days to those that might take more than a year to make operational. This latter point is important because it makes clear that the removal of forces from "operationally deployed" status can be reversed more or less quickly. Reductions have the advantage of irreversibility, as long as the warheads are disassembled, and this is an important consideration with respect to Criterion III above.

Starting with Feasible Reductions: Stages 1 and 2

How far can the United States and Russia reduce their strategic nuclear forces without having to take extraneous factors into account? There is little doubt that the two countries could reduce their forces to a level significantly lower than that set in the Moscow Treaty and still maintain a stable relationship within the framework of nuclear deterrence. Two recent studies have suggested that the United States and Russia could each reduce their strategic nuclear warheads to a level of about 1000.[25]

25. These two studies are not the only ones to have suggested 1000 as the target

Aleksei Arbatov and Vladimir Dvorkin have proposed that the United States and Russia could reduce their "operationally deployed strategic nuclear warheads" to 1000–1200 on each side, as long as the two sides can agree on definitions, counting rules, and verification. They argue that this is the lowest ceiling that the two countries could establish without taking into account the nuclear forces of other states, the counterforce capabilities of highly accurate conventional long-range systems, and the possible capabilities of air and missile defenses. They suggest 2017 as the target date for attaining the level of 1000–1200 nuclear warheads. Although they examine the strategic forces of both sides, Arbatov and Dvorkin do not propose any particular force structure for Russia or for the United States; nor do they discuss the idea of limits on the responsive force.[26]

Sidney Drell and James Goodby have proposed that the United States reduce its "operationally deployed strategic nuclear warheads" to 500 and set a ceiling of 500 warheads for the responsive force. The goal would be 500/500 within five years. They argue that an operationally deployed force of 500 nuclear warheads would be "more than adequate for deterrence." The responsive force would be configured in two parts, the first a Ready Responsive Force, able to respond to a crisis, and the second a Strategic Responsive Force that would be able to respond to warning signals of a year or so. They propose, for illustrative purposes, an operationally deployed force consisting of three Trident submarines on station at sea, each armed with 24 missiles and 96 warheads, 100 Minuteman III ICBMs in hardened silos, each with a single warhead, and 20–25 bombers. The Ready Responsive Force could consist of three Trident submarines, each with 96 warheads, in

for reductions by the United States and Russia before other nuclear powers are brought into the process of disarmament. See especially the report by the National Academy of Sciences' Committee on International Security and Arms Control, *The Future of US Nuclear Weapons Policy* (Washington, D.C.: National Academy of Sciences, 1997), pp. 77–78.

26. Aleksei Arbatov and Vladimir Dvorkin, "Otkhod ot vzaimnogo sderzhivaniia," in Arbatov and Dvorkin, eds., *Iadernoe oruzhie* . . . (note 15), pp. 107–110.

transit or in port, and 2–3 boats in overhaul; the Strategic Responsive Force would consist of 50–100 additional Minuteman missiles taken off alert and without warheads and 20–25 bombers, unarmed, in maintenance and training.[27] This is a more radical proposal than that offered by Arbatov and Dvorkin.

These two studies, by American and Russian experts, both focus on 1000 warheads as a level to which each country could reduce its strategic nuclear forces without taking into account the nuclear forces of third countries. They therefore provide a good starting point for a discussion of reductions in U.S. and Russian strategic nuclear forces. The two proposals can be considered as alternatives, but here they are presented as different stages in the process of nuclear disarmament.

Stage 1: *The United States and Russia would each have 1,000 operationally deployed strategic nuclear warheads, with an additional undefined number of warheads in the responsive force.*

Strategic stability: The studies by Arbatov and Dvorkin, and by Drell and Goodby, indicate that it should be possible for both sides to deploy survivable forces capable of destroying a range of targets in response to a surprise nuclear attack. A stable deterrent balance could be constructed.

Monitoring and verification: Arrangements exist under the START Treaty for monitoring deployed warheads. The problem of monitoring non-deployed warheads would exist even if both sides said they did not have such warheads. The temptation to conceal warheads would not be great at this stage, however, because the benefit to be gained from secretly reconstituting additional strategic forces would be small, given that a surprise attack would not be able to prevent the other side from retaliating with a powerful nuclear strike. Each side could declare how many non-deployed warheads it had, without necessarily

27. Drell and Goodby (note 22), pp. 14–18.

making special arrangements to allow those declarations to be verified. It should be borne in mind, however, that cheating (in the sense of making false declarations) or suspicions of cheating could have serious political consequences, even if their operational consequences were minimal.

Contribution to elimination: This option would reduce the number of strategically deployed warheads on each side to about 50 percent of the Moscow Treaty target. This would be a significant indication of the willingness of the United States and Russia to reduce their strategic nuclear forces and, if framed in the right way, of their intention to eliminate nuclear weapons. This option could be an important step on the road to a world free of nuclear weapons. It does not, however, make that road any easier to travel because it suggests that it is essential to have operationally deployed strategic nuclear forces, thereby implying that each side believes that nuclear deterrence retains at least something of its former importance.

This stage could be implemented by taking two straightforward steps. First, as James Goodby has proposed, the United States and Russia could insert into the Moscow Treaty a new limit on the number of strategic nuclear warheads. They could replace the number 1700–2200 with the number 1000 or something close to it. They could extend by a year or two the date for achieving the new target, if that were deemed to be necessary. The second step is to ensure that the parts of the START Treaty that are relevant to verification and monitoring be incorporated—perhaps in a modified form—into a new agreement before START expires in December 2009. These two steps constitute a feasible starting point for substantial reductions in nuclear forces. If these steps were accompanied by a joint statement by the two countries' presidents to the effect that they shared the vision of a world without nuclear weapons, that would provide an even stronger impetus to the process of disarmament.

A logical second step would be to adopt the proposal made by

Drell and Goodby to reduce the number of operationally deployed warheads on each side to 500 and to set a limit of 500 or so on the size of the reserve force.

Stage 2: *The United States and Russia would each have 500 operationally deployed strategic warheads and 500 strategic nuclear warheads in the responsive force.*

Strategic stability: With a limit of 500 "operationally deployed strategic nuclear warheads," it should still be possible to maintain a strategic nuclear force capable of retaliating against a range of enemy targets in the event of a nuclear strike. The 500 warheads could be allocated to the three elements of the strategic triad. As noted above, Drell and Goodby propose a notional force structure for the United States, but alternatives should be considered.

Monitoring and verification: Monitoring of the deployed force would certainly be possible, but monitoring and verification of the non-deployed force would be more difficult. It might not be possible to know with absolute assurance how many nuclear warheads there were in the responsive force. Relatively small uncertainties would not matter, because they would not be likely to upset the balance created by the deployed forces. But at this point the issue of monitoring and verification begins to become very significant for the whole project. As mentioned above, limits on launchers and delivery vehicles would be helpful in this respect.

Contribution to elimination: This arrangement would be a further step on the path to eliminating nuclear weapons. It would make clearer than Stage 1 the possibility of taking nuclear weapons out of the current U.S.-Russian relationship and moving deterrence further into the background.

Stage 1 could be implemented by the United States and Russia without regard to the policies of the other nuclear powers. Before

proceeding to Stage 2, however, it would be essential to begin to take into account a number of factors that will be discussed below.

Going to Zero Deployed Warheads: Stage 3

The next step is the more radical one of limiting the size of each country's strategic nuclear force to 500 strategic warheads, none of which would be operationally deployed. This is the Zero Deployed Warheads option.

Stage 3: *Zero Deployed Warheads: the United States and Russia would each have zero deployed strategic warheads and 500 strategic warheads in the responsive force.*

Strategic stability: The question of survivability does not arise for deployed forces (because there aren't any) but it does arise for non-deployed forces. Each country will want to retain the ability to reconstitute its strategic forces in case it should believe it needs to do so, but each will also fear the possibility that the other will breakout by means of a rapid reconstitution of strategic forces. Reconstitution of strategic forces by one side or the other is a key issue, and each side will have to take it into account in planning its own force structure—SSBNs in port, for example, are much more vulnerable than SSBNs on station. Careful planning will be needed to ensure that neither side can achieve the capability to destroy the other's strategic forces by clandestinely reconstituting its forces and launching a surprise attack. There are two approaches to dealing with this problem. The first is to provide effective monitoring and verification. The second is to ensure as far as possible the survivability of each side's forces, while recognizing that the goals of survivability and transparency may well come into conflict.

There has been a good deal of discussion, especially in the context of South Asia, of various forms of "virtual deterrence," exercised by forces that are not operationally deployed. Deterrence in such a case

rests on the understanding that the other side could deploy operational forces in a crisis, if it decided to do so, or retaliate after an attack if it failed to deploy its forces in time. The Indian strategic thinker Jasjit Singh has proposed one variant of such "virtual deterrence," which he calls "recessed deterrence":

> All elements of the deterrent (warheads, delivery systems and infrastructure) are kept at a level of preparedness which allows for their rapid shift to a deployed status. This is not a doctrine of ambiguity, but one that seeks to define capabilities that can be rapidly transformed into an operational arsenal of a certain minimum level. This would provide an additional level of deterrence against escalation of tensions into a conflict since the adversary would know, and should be told, that India will move towards an operational arsenal if the security environment deteriorates.[28]

Singh characterized this as a policy of nuclear restraint, but one that would still have a deterrent effect. This would be different from "nuclear opacity," a term sometimes used to characterize Israeli nuclear policy, because "recessed deterrence" requires some degree of transparency, as well as restraint. The important point here is that nuclear weapons, even if not operationally deployed, can still exercise a deterrent effect.

Monitoring and verification: These are especially important at this stage. The total number of warheads held by the other side would not necessarily be the greatest concern. The crucial issue would be the ability to monitor the other side's state of readiness and to detect any moves it might take to reconstitute its strategic forces. It would be dangerous to have a situation in which one side could reconstitute its strategic forces before the other could do so, if those forces could then pose a serious threat to the other side's forces. That would create the danger of a mobilization race triggered by a political crisis. Mobili-

28. Jasjit Singh, "The challenges of strategic defence," *Frontline*, April 11–18, 1998. Accessed at www.hinduonnet.com/fline/fl1508/15080130.htm

zation, in those circumstances, could have an escalatory effect, adding to political tension.[29]

Contribution to elimination: This stage would move the world further along the path toward the elimination of nuclear weapons. By removing their forces from operational deployment, the United States and Russia would make clear their belief that nuclear weapons could be moved into the background of international politics. (This could be called a form of nuclear latency.) Zero Deployed Warheads has two other important advantages. The first is that, as Bruce Blair's paper argues, the danger of accidental nuclear war or nuclear launches would be greatly reduced if neither side kept its strategic nuclear forces on a high state of alert. [See Chapter 2.] Second, maintaining strategic nuclear forces in a responsive mode could reduce the danger of terrorists seizing nuclear warheads. The nuclear arsenals could be made more secure, and warheads would not need to be shuttled between launch sites and maintenance facilities, thus reducing the amount of time they spend in transit when they are most vulnerable to seizure.

Zero Deployed Warheads is clearly an advance on the other stages from the point of view of Criterion III, because it would do the most to move the world along the path to the elimination of nuclear weap-

29. According to the British White Paper on Trident, "any move from a dormant program towards an active one could be seen as escalatory, and thus potentially destabilizing, in a crisis." See *The Future of the United Kingdom's Nuclear Deterrent* Cm 6994 (London: HMSO, December 2006), p. 21. On the other hand, Rajesh Basrur, one of the shrewdest analysts of Indian nuclear policy, has written that the fact that both India and Pakistan kept their weapons in a non-deployed state (warheads unassembled and separate from delivery vehicles) contributed a "high degree of built-in stability" during the Kargil crisis of 1999 and the confrontation of 2001–02. "When tensions are high," he writes, "a fully deployed weapon system is extremely threatening, and also susceptible to early use in the event of misperception of the adversary's intentions." He does go on to say that a caveat is in order: "If nuclear weapons are deployed at some point in a crisis, this would constitute a sudden escalation that would also be destabilizing." Rajesh M. Basrur, *Minimum Deterrence and India Pakistan Nuclear Dialogue: Case Study on India* (Como, Italy: Landau Network—Centro Volta, March 2006), p. 12.

ons. From the point of view of Criteria I and II it is the most difficult, because it seems to contain the greatest danger of instability and because it puts the greatest demands on verification and monitoring. It might therefore be appropriate to consider a variant of Stage 3, whereby a relatively small number of warheads (say 50–100) remain operationally deployed until satisfactory arrangements are worked out for dealing with the reconstitution problem. (Measures could be taken to ensure these forces were not on high alert.) The United States and Russia would then have up to 100 deployed warheads each, and 400 non-deployed.

This variant would meet Criteria I and II more easily; it would not be the most desirable from the point of view of Criterion III, for reasons spelled out in the discussion of that criterion. In the context of the deterrent relationship between two nuclear powers, it might indeed make sense to keep a small number of strategic nuclear warheads operationally deployed, in order to provide an assured retaliatory capability. If, however, one accepts the argument that a discriminatory nuclear regime will not work, then zero deployment is likely to make a greater contribution to the elimination of nuclear weapons, because a policy of keeping some forces operationally deployed implies a greater need on the part of states for nuclear weapons in the face of strategic uncertainty—an argument that many states could invoke to justify the possession of nuclear weapons.

There are many technical and operational issues that would need to be resolved in passing through these stages toward the elimination of nuclear weapons. It is not clear how long that process would take, and it therefore does not appear to be useful to propose a timetable. It would, however, make a great deal of sense to move quickly—say within two years—to agree to implement Stage 1. In December 2009, START expires, and in 2010 another Nuclear Nonproliferation Treaty review conference will take place. It would be very desirable, from the point of view of further reductions, if the United States and Russia could implement Stage 1 before those dates. It might be appropriate

to pause and take stock after each stage, as long as that did not weaken the commitment to further reductions.

Progress in disarmament should itself reinforce each side's confidence in the other's intentions, thereby making it easier to resolve the various issues that need to be dealt with. For example, as confidence grows, it should be possible for each side to reduce the number of warheads it estimates it needs for a retaliatory strike and the number of targets it calculates it needs to hold at risk. Even within the framework of deterrence theory, the answer to the question "How much is enough?" is not a fixed number; it changes as political and military circumstances change.

Or to take another example, the requirements for verification and monitoring become more stringent as the disarmament process moves from Stage 1 to Stage 3. Existing experience provides the means to monitor Stage 1, but careful analysis is needed to develop the appropriate approaches and methods for monitoring deeper reductions. The commitment to disarmament, and the process of disarmament itself, should encourage trust and openness in the area of nuclear weapons, reassuring each side about the intentions of the other and making both sides more willing to accept the verification provisions needed to monitor the path to the elimination of nuclear weapons.

Verification and Monitoring

The Moscow Treaty contains no explicit provisions for verification. It relies on the verification and monitoring arrangements of the START Treaty, the most elaborate in the history of strategic arms control. As noted above, President Bush stressed the importance of the START provisions for monitoring and verification when he sent the Moscow Treaty to the Senate for ratification. START expires in December 2009. Secretary of State Rice and Foreign Minister Lavrov announced in July 2007 that they had begun to discuss the development of a post-START arrangement "to provide continuity and predictability" with respect to strategic offensive forces. It would be a great mistake to

discard the START experience, to fail to make use of it as the basis for verifying further reductions.

The START provisions for verification and monitoring have worked well. They have created a high level of transparency, and each side has considerable confidence that it knows the nuclear weapons deployments, technical characteristics, and activities of the other. START has established a number of principles that are accepted by the United States and Russia: it forbids the two sides from interfering with each other's National Technical Means (NTM); it bans most forms of telemetry encryption, providing reassurance that ICBM and SLBM tests are not being used for illegal purposes; it establishes a system of on-site inspections and creates a special system of notifications and numerical and geographical constraints that control the numbers and locations of mobile ICBMs.

More generally, the United States and Russia have come to accept a number of well-understood verification tools, and these can be used in monitoring the different stages on the path to the elimination of nuclear weapons. These tools include National Technical Means; Data Exchange/Notifications; On-Site Inspection, both routine and challenge; Perimeter and Portal Continuous Monitoring; nuclear detection devices, both handheld and fixed; remote monitoring techniques developed by UNSCOM and UNMOVIC in Iraq. The paper by Ray Juzaitis and John McLaughlin examines the relationship of this experience to further reductions in nuclear forces. [See Chapter 4.]

The United States and Russia have considerable experience in monitoring warheads deployed on (or attributed to, in accordance with the START counting rules) missiles and bombers. They have not, however, attempted to monitor non-deployed warheads, which would be required by Stages 2 and 3 above. This presents a much greater challenge, because warheads are much smaller and easier to hide than bombers, submarines, or missile silos. Each side could make a declaration of the number of warheads it had in its responsive force, even

perhaps including the kinds of warheads it has, e.g., for missiles or bombers. That would provide a total for the other side to monitor.

The two countries may not be willing, however, to say where their warheads are stored, because that would make the warheads more vulnerable to attack. Various approaches to monitoring will therefore need to be explored. It might be possible to monitor the perimeters of launch sites in order to provide warning of any effort to deploy warheads. It should also be possible to agree to limits on launchers, since the ability of one side or the other to violate an agreement would be bounded, to some degree at least, by the number of launchers it had available to it. Restrictions on force structure and delivery vehicles (e.g., a ban on MIRVs) would also be helpful in this respect. Controls on fissile materials, as discussed in Robert Einhorn's paper, would have an important role too. [See Chapter 8.] Finally, if arrangements could be made to monitor the production as well as the disassembly of strategic warheads, that also could be helpful in discouraging reconstitution of non-deployed strategic forces.

Missile defenses

Is there a role for ballistic missile defenses in the process of nuclear disarmament? The answer depends on the context in which they are deployed. In a world of nuclear deterrence, even with deterrence becoming increasingly virtual or residual, missile defenses are likely to hinder the effort to reduce and eliminate nuclear weapons. If a state concerned about its ability to retaliate in the event of a surprise attack is confronted by missile defenses, it will be less willing to reduce its offensive forces and may indeed want to increase them. Even if the defenses are ineffective and can be overcome by countermeasures, the country against which they are aimed is likely to exaggerate their capability and to plan for the worst contingency. (The history of ballistic missile defense is rich in exaggerated claims, and exaggerated fears, of the effectiveness of these systems.) In that context missile

defenses will be an obstacle to the reduction of strategic nuclear warheads.

In a world without nuclear weapons, missile defenses could *in principle* provide a partial safeguard against possible breakout from the non-nuclear-weapons regime. Whether it made sense to deploy them would depend on assessments of the effectiveness of the particular missile defense system against possible threats. It would also depend on the priority accorded to missile defenses as opposed to other defensive measures, given that ballistic missiles are not the only means by which nuclear weapons can be delivered. Nevertheless, it is conceivable that missile defenses might help to stabilize a world without nuclear weapons and to establish the condition of defense dominance. It is worth noting, however, that even in these circumstances missile defenses would have to be organized cooperatively, in such a way as to avoid creating the impression (or the reality) that the defenses were themselves part of a breakout strategy on the part of an individual state.

There is a third, and perhaps more immediately promising, option. The United States and Russia (and other countries too) could cooperate in the development of ballistic missile defenses even as they engage in the process of reducing their strategic warheads. The United States and Russia have more than once expressed an interest in such cooperation. (Ronald Reagan raised it at Reykjavik, though Mikhail Gorbachev responded skeptically.) Presidents Bush and Putin have supported the idea of missile defense cooperation.[30] The issue has come up recently in the context of the controversy over U.S. missile

30. For example, in their May 24, 2002, Joint Declaration on the New Strategic Relationship, Presidents Bush and Putin stated: "The United States and Russia have also agreed to study possible areas for missile defense cooperation, including the expansion of joint exercises related to missile defense, and the exploration of potential programs for the joint research and development of missile defense technologies, bearing in mind the importance of the mutual protection of classified information and the safeguarding of intellectual property rights." Accessed at www.state.gov/t/ac/trt/18016.htm#5.

defense installations in Europe.[31] Cooperation could cover such areas as early warning of ballistic missile attack, tracking and discrimination of warheads and decoys, and even interception; it could extend from R&D to the operation of the system. What form cooperation should take is a matter for joint study and analysis. This is not to say that cooperation will be easy: various obstacles—institutional, technical, strategic, and political—spring readily to mind. The important point to make here, however, is that only through cooperation will it be possible to ensure that missile defenses help, rather than hinder, nuclear disarmament. Without such cooperation missile defenses will lessen the likelihood of reductions in strategic nuclear forces. On the other hand, cooperation in this area, if it proved successful, would have considerable positive value in helping to create the trust necessary for moving along the path to the elimination of nuclear weapons.

For these reasons, the current controversy over missile defenses in Europe needs to be resolved in order to ensure that missile defenses do not constitute an obstacle to further reductions in nuclear forces.

Bringing in the other nuclear powers: Stage 4

This paper has focused so far on U.S. and Russian strategic nuclear warheads, i.e., on those systems covered by the START and Moscow treaties. Rose Gottemoeller's paper looks at non-strategic nuclear weapons. [See Chapter 3.] The distinction between strategic and non-strategic nuclear weapons is a matter of (sometimes disputed) convention, and warheads are strategic or non-strategic only by virtue of being loaded onto strategic or non-strategic delivery vehicles. As the United States and Russia move toward Zero Deployed Warheads, the distinction between the two kinds of warhead, which is based to a great extent on the range of their delivery vehicles, will make less and less sense. At some point in the process of disarmament, therefore,

31. See Theodore Postol, "A Ring Around Iran," *New York Times*, July 11, 2007; Henry A. Kissinger, "Don't Rule Out Putin's Initiative," *International Herald Tribune*, August 9, 2007.

that distinction should be dropped and each country's stockpile assessed in terms of all the warheads it contains. This should certainly be done before the nuclear forces of other countries are brought into the process of disarmament, since the definitions employed in the case of the United States and Russia cannot easily be applied to the nuclear forces of other countries.

The merging of strategic and non-strategic warheads into a single category has implications for the stages discussed above and would need to be managed carefully. The reductions set out in Stage 1 could be undertaken without taking non-strategic systems into account. For Stage 2 it would be desirable to have a clearer mutual understanding of the non-strategic nuclear warheads each side has, and perhaps to have agreed limits on those warheads. The merging of strategic and non-strategic warheads into one category should be completed—or at least well advanced—before the two sides have implemented the Zero Deployed Warheads option. This is an important issue that requires careful analysis. Important though it is, it cannot be addressed here. The paper now turns to the question of involving the other nuclear states in the process of disarmament. In the rest of this paper no distinction will be drawn between strategic and non-strategic nuclear warheads.

Seven countries besides the United States and Russia possess nuclear weapons. This number includes North Korea, but since specific negotiations are under way to de-nuclearize the Korean Peninsula, North Korea will not be discussed here. The three recognized nuclear weapons states—Britain, France, and China—first tested nuclear weapons in 1952, 1960, and 1964. They have possessed nuclear warheads for decades, but none has tried to match the United States and the Soviet Union in numbers of nuclear weapons. They have maintained relatively stable stockpiles consisting of hundreds, not thousands, of nuclear warheads. Britain and France have reduced their nuclear forces since the end of the Cold War. China has maintained a comparatively small nuclear force even as its economy has grown

by leaps and bounds, though it is now modernizing its strategic forces, and it is not clear where that will lead.[32] None of these states has shown the desire, nor made the effort, to match the nuclear forces of the United States or the Soviet Union/Russia.

The second group of nuclear states—Israel, India, and Pakistan—acquired their nuclear weapons later, and their stockpiles are currently smaller than those of Britain, France, and China (though the upper limit of the estimate for Israel puts Israel on a par with Britain and China). Israel is believed to have built its first nuclear weapons in the late 1960s; India tested a nuclear device in 1974; and Pakistan is thought to have acquired nuclear weapons by the late 1980s. The Israeli nuclear force is estimated to consist of 100–200 weapons. The Indian and Pakistani nuclear forces are estimated to be smaller: 50–60 for India and 40–50 for Pakistan. The Indian and Pakistani nuclear stockpiles have been growing. It is not clear, however, how far, or how rapidly, they will grow in the future.

The deployment practices of the six nuclear states other than the United States and Russia differ from one country to another. Britain and France maintain operationally deployed strategic forces. Chinese strategic warheads are not mated with missiles and are reported to be stored separately from—but near—the delivery vehicles; that practice may change in the direction of greater operational readiness as China deploys new mobile missiles and SLBMs.[33] India and Pakistan appear

32. What the implications of this are for the size of the Chinese nuclear stockpile is not clear. The December 2006 Chinese White Paper on National Defense says: "China upholds the principles of counterattack in self-defense and limited development of nuclear weapons, and aims at building *a lean and effective nuclear force* capable of meeting national security needs. It endeavors to ensure the security and reliability of its nuclear weapons and maintains a credible nuclear deterrent force." [Emphasis added.] *China's National Defense in 2006* (Beijing: State Council of the PRC, December 2006), section II. According to a Pentagon report, "China is qualitatively and quantitatively improving its legacy strategic forces." *Annual Report to Congress: Military Power of the People's Republic of China 2007* (Washington, D.C.: Office of the Secretary of Defense), p. 18.

33. See Jeffrey Lewis, *The Minimum Means of Reprisal: China's Search for Se-*

to maintain their nuclear weapons in a non-deployed state, with warheads unassembled and at some distance from the delivery vehicles. No information is available on Israeli practice.

If nuclear weapons are to be eliminated, these six powers obviously must become involved in the process of disarmament. Before looking at the ways in which they can be brought into that process, there is an important point to be made about the political context. It is the end of the Cold War that has made it possible for the United States and Russia to make significant reductions in their enormous nuclear forces. In the section above on the political and doctrinal context for substantial force reductions, the argument was made that the changed political relationship between the United States and Russia has made it possible to contemplate substantial reductions in nuclear forces beyond those that have already taken place. In other words, the political changes caused by the end of the Cold War could be further exploited by the United States and Russia in the interests of disarmament. Britain and France have reduced their nuclear forces too since the end of the Cold War. Their forces are significantly smaller than those of the United States and Russia, and the opportunity for reductions short of elimination also smaller.

The end of the Cold War has not affected the nuclear policies of the other four nuclear powers in the same way. China has not reduced its small nuclear force, and has indeed embarked on a serious program of modernization, though it is not clear what the implications of that program are for the size of China's nuclear stockpile. Israel's nuclear policy can be understood only in the context of the Middle East, where Israel has confronted—and still confronts—hostile states that refuse to acknowledge its right to exist. The removal of nuclear weapons from the Middle East will require a transformation of the politics of

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curity in the Nuclear Age (Cambridge, Mass.: The MIT Press, 2007), pp. 27, 165–166. For a deep analysis of China's approach to command and control, see John Wilson Lewis and Xue Litai, *Imagined Enemies: China Prepares for War* (Stanford, Calif.: Stanford University Press, 2006).

the region. Similarly, the nuclear forces and nuclear policies of India and Pakistan are, in great measure, rooted in the conflict between the two states over Kashmir, though China has had, and continues to have, an important impact on the nuclear policies of both states. Eliminating nuclear weapons from South Asia will depend, in part at least, on the normalization of relations between India and Pakistan. In other words, some resolution of the conflicts in South Asia and the Middle East will be necessary if nuclear weapons are to be eliminated from those regions.

The Stage 1 target of 1000 operationally deployed strategic warheads was chosen precisely so that the United States and Russia could reduce their forces to that level without taking the other nuclear powers into account. This indicates that the reduction of U.S. and Russian forces to the level of 1000 operationally deployed strategic nuclear warheads need not—and indeed should not—be made conditional on obtaining specific commitments from the other nuclear powers. If, however, further progress is to be made in reducing nuclear forces, several commitments will in time be required from the other nuclear powers:

1. The first is a commitment not to increase their nuclear warheads significantly beyond the levels they now have.
2. The second is to agree to greater transparency, and ultimately to inclusion in an international regime of monitoring and verification.
3. The third commitment is to maintain nuclear forces in a responsive mode rather than operationally deployed, according to some agreed definition of those terms.

Only when these commitments are forthcoming will it be possible to move to a world with zero deployed nuclear warheads and ultimately without nuclear weapons at all. It would make sense to begin official consultations on these points once the United States and Russia have initiated consultations on the Stage 1 reductions; unofficial consultations should begin as soon as possible.

How likely are the six nuclear powers to accept these three commitments?

First, only the United States and Russia have at present more than 500 nuclear warheads. The other nuclear powers have smaller arsenals and—apart perhaps from China, India and Pakistan—do not appear to be planning to increase their arsenals. They should, therefore, be willing to make the first commitment, namely, not to increase significantly the number of warheads they now have or are currently planning to have. They would presumably be all the more willing to do this if they thought that their *unwillingness* to make this commitment would discourage the United States and Russia from continuing with the process of nuclear disarmament. They might seek to ensure, however, that an equal ceiling—500 or even 200—be set for all nuclear forces. (A limit of 200 would require reductions by France, as well as by the United States and Russia, but apparently not by the other nuclear states.)

Second, apart from Britain and France, the other nuclear powers make public very little information about their current nuclear forces or about their force development plans. They would, of course, become more transparent if they were to adopt the practices that are now customary in U.S.-Russian relations. That might prove difficult for Israel and for India and Pakistan, in view of the political tensions in the Middle East and South Asia—though India and Pakistan have been pursuing confidence-building mechanisms for reducing the risk of nuclear war and avoiding an escalation of their nuclear rivalry.

Progress in nuclear disarmament will require movement toward a global verification and monitoring regime, perhaps including regional arrangements such as exist between Argentina and Brazil, which have created mechanisms for monitoring each other's nuclear programs. Otherwise it will not be possible to provide the assurances, or establish the confidence, necessary for substantial reductions. It should be pointed out that the closer the existing nuclear powers come to approaching a state of latency, the more the latent nuclear powers, which

have never had nuclear weapons but have some capacity to make them, will have to be drawn into the monitoring and verification regime. Ultimately, in a non-nuclear-weapons world, all states would be subject to the same regime.

Third, apart from Britain and France, the other nuclear powers do not appear to have operationally deployed warheads. (China may change its practice when it deploys SLBMs and mobile ICBMs.) They should therefore be willing to accept the commitment to non-deployment. Britain and France, however, regard operationally deployed forces as an essential part of their deterrent. The British government does not think it advisable to remove all its strategic warheads from operationally deployed status. It rejects the idea of a "dormant" strategic force.[34] Britain's nuclear force is now based on one system, the submarine-launched ballistic missile, and the number of "operationally available warheads" is being reduced to fewer than 160 (the overall stockpile being somewhat larger). Normally only one Trident SSBN is on patrol at any given time, with up to 48 warheads on board. Britain has reduced the state of alert of its force since the end of the Cold War, with the submarine on patrol normally "on several days notice to fire."[35] France has a larger nuclear force, consisting of about 350 warheads, based on two systems: submarine-launched ballistic missiles and air-launched cruise missiles. Like Britain, France keeps at least one SSBN on patrol at any given time, each submarine capable of carrying 16 SLBMs with up to six warheads apiece. (British and French operationally deployed forces are very much smaller than the forces currently deployed by the United States and Russia (1–3 percent) and than the forces allowed in the Moscow Treaty (3–6 percent).) It is possible that Britain and France might change their position on deployment in the context of sharp reductions in U.S. and Russian forces, especially if the United States and Russia were ready

34. *The Future of the United Kingdom's Nuclear Deterrent* (note 24), p. 21.
35. *The Future of the United Kingdom's Nuclear Deterrent* (note 24), p. 13.

to go to zero deployed warheads, but this is an issue that would have to be dealt with at the time.

This discussion suggests that while there are serious obstacles to be overcome, it is not inconceivable that the other nuclear states would be willing to make commitments that would allow the United States and Russia to make far-reaching cuts in their nuclear warheads to the level of 500 or even lower, say to the level of 200.

If the six other nuclear powers besides the United States and Russia were to make the commitments outlined above, there would then be a nuclear regime in which no nuclear state had more than 500 (200) warheads, each nuclear state participated in a regime of verification and monitoring, and no state had operationally deployed strategic warheads.

How does this stage, Stage 4, measure up against the criteria set out earlier in the paper? Two variants should be considered, *Variant 1*, with no operationally deployed nuclear warheads, and *Variant 2*, with 50–100 operationally deployed warheads.

Stage 4 (Variant 1): *No state has more than 500 (200) nuclear warheads, and none of the nuclear warheads is operationally deployed.*

Strategic stability: The problem of stability in a multipolar nuclear world, in which each state possesses relatively small forces, presents novel problems and would need careful study. Force levels under this option appear to be sufficient to give each state the capacity to retaliate in the event of a surprise attack by an individual state. Complications might arise if two or more states were likely to act jointly against another state. Policymakers and military planners in each state would have to take account of that possibility. The U.S.-U.K. relationship would be brought into question: Could the two countries be treated as separate entities when they engage in joint planning and targeting? Would NATO count as a single entity? Would conventional forces—

especially long-range conventionally armed missiles—have to be taken into account? If the total number of nuclear warheads permitted to any state were reduced to 200 from 500, would that make a difference? These questions need to be looked at in a broad political context, with attention to new international security arrangements to allay some of the anxieties that reductions to this level might cause.

Monitoring and verification: These would be no less important in this case than in Stage 3. In fact the verification regime would by definition have to be more comprehensive, because it would include more states. The arrangements for monitoring the nuclear activities of states with a latent nuclear capacity would need to be strengthened.

Contribution to elimination: A world with zero operationally deployed nuclear weapons would mark a further significant step on the road to a world without nuclear weapons, as long as the dangers of instability and verification could be dealt with. This would be a very different nuclear world, and a good deal of consultation and analysis would be needed to understand what its dynamics might be. One of the crucial questions is whether the radical reduction in nuclear forces would discourage other states from acquiring nuclear weapons or encourage them to try to do so. This is a question that goes beyond the scope of this paper, but it is one that needs careful attention.

Given the British and French insistence on having some operationally deployed warheads, it makes sense to consider a separate variant that includes operationally deployed forces, as was done for Stage 3 above. As with Stage 3, a *Variant 2* that permits the operational deployment of up to 50–100 nuclear warheads (on reduced states of alert) might make it easier to meet Criteria I and II, though it would not do as much as *Variant 1* to move toward the elimination of nuclear weapons. This variant too would need careful study and analysis. It could perhaps be considered as an interim option before moving to zero deployed warheads. There are those who would argue that nuclear balances at low levels would be more stable if each nuclear power

had some operationally deployed warheads. Even if that were the case—and it is by no means clear that it is—*Variant 2* carries the serious disadvantage, spelled out above, that insistence by the nuclear powers on having operationally deployed nuclear forces may provide non-nuclear weapons states with rationales for acquiring nuclear weapons of their own.[36]

At what point should the six nuclear powers be drawn into the process of disarmament? The United States and Russia would be more likely to begin to move from 1000 warheads to 500 warheads if they had agreements (even informal ones) on levels of forces and on transparency with the other nuclear powers. (Their incentive to reduce their nuclear forces would diminish if they thought that their reductions might lead to, or be matched by, an increase in the nuclear forces of other states.) It is possible, of course, that the other nuclear powers would make commitments about their own force levels conditional on continuing reductions in the strategic forces of the United States and Russia. This suggests that official consultations on these issues with all relevant countries should begin early in the process of disarmament—as soon as the United States and Russia have initiated discussions on Stage 1 reductions—so that potential obstacles can be identified as soon as possible. Unofficial consultations could start immediately for the same purpose.

Making Deep Reductions

This paper has outlined four stages by which deep reductions could be made in nuclear forces. It has charted an overall approach to further reductions in nuclear forces, suggesting that there is a feasible starting point (Stage 1) and a transformed nuclear world that is at least conceivable (Stage 4). The paper has pointed to some of the most important issues that need to be resolved. Many of these issues—stabil-

36. For an acute analysis of this question, see Beatrice Heuser, "The British and French Nuclear Postures: Blair's and Chirac's Legacies" (unpublished paper).

ity, reconstitution, verification, and latency—are by and large familiar, but not less complex for that. There are, besides, many technical and operational questions that it has not been possible to discuss in detail here; for example, there has been no discussion of the relationship between nuclear and conventional balances as nuclear forces are reduced.

These issues notwithstanding, Stage 1 could be implemented—as was pointed out above—by taking two straightforward steps. The United States and Russia could insert into the Moscow Treaty a new limit on strategic nuclear warheads, replacing the number 1700–2200 with the number 1000. They could also ensure that the parts of the START Treaty that are relevant to verification and monitoring be incorporated—perhaps in a modified form—in a new agreement. Those two steps would give new impetus to the process of making substantial reductions in nuclear forces. If the alert status of the operationally deployed nuclear warheads were reduced at the same time in line with Bruce Blair's proposals, that would give these two steps added significance. [See Chapter 2.] Preparations could be made also for ratification of the Comprehensive Test Ban Treaty. If this group of measures were accompanied by a joint statement by the two countries' presidents to the effect that they shared the vision of a world without nuclear weapons, that would make the impetus even stronger. It is worth noting that public opinion in the United States and Russia is very largely in support of these measures.[37]

James Goodby has also proposed the Zero Option, under which no nuclear warheads would be operationally deployed anywhere in the world. This corresponds to Stage 4 (Variant 1) above. Goodby proposes four steps for achieving that goal. The first is a U.S.-Russian treaty gradually reducing operationally deployed warheads to zero; the

37. Steven Kull et al., *Americans and Russians on Nuclear Weapons and the Future of Disarmament: a Joint Study of WorldPublicOpinion.org and the Advanced Methods of Cooperative Security Program*, CISSM (University of Maryland: November 9, 2007).

second is the development of transparency measures and a commitment by each side not to have more than 500–1000 non-deployed warheads; the third is for the other nuclear weapons states to freeze their holdings and go to a non-deployed status by the time the United States and Russia had done so; the fourth is acceptance of verifiable measures to guard against clandestine or sudden reconstitution of nuclear forces. This process parallels the stages outlined in this paper, and it would raise the same issues. It puts more emphasis on de-alerting, and less on reductions, as a way of implementing the Zero Option, though reductions are of course an ineluctable part of the process of moving to a world without nuclear weapons. One benefit of the Zero Option is that it emphasizes how reductions and de-alerting can combine to form part of the strategy for ridding the world of nuclear weapons.

If all the parties involved accept the goal of a world without nuclear weapons, then they can focus collectively on the barriers to achieving that goal.[38] If the intermediate, but still radical, goal of zero deployed warheads is accepted as an interim target, then that goal can provide the basis for cooperation. Barriers can be of different kinds—strategic, legal, institutional, and psychological, for example. This paper has considered some of the barriers—the danger of breakout, for example—but there are others that have not been discussed here or have been mentioned only in passing. Among these are psychological barriers such as worst-case planning; historical and cultural barriers to do with the symbolic meaning of nuclear weapons for different societies; or institutional barriers arising out of traditions of military planning. The vision of a world without nuclear weapons is important precisely because it focuses attention on the barriers to achieving it; only in that context can those involved see what the barriers are and work jointly to overcome them.

38. On this approach, see Kenneth J. Arrow et al, eds., *Barriers to Conflict Resolution* (New York: W.W. Norton, 1995).

Should reductions be made through negotiated treaties or by unilateral steps that are then reciprocated by the other side? Both approaches can be employed, depending on the specific circumstances. The United States and Russia could reduce their strategic nuclear warheads to the level of 1000 by making parallel or unilateral statements of the kind that form the core of the Moscow Treaty, allowing each side to structure its forces as it wants.[39] Arbatov and Dvorkin argue that, before such a reduction is made, agreement should be reached on definitions, on counting rules, and on verification procedures. Whether or not all of those issues have to be resolved before reducing forces to 1000 may be an open question, but they will have to be resolved sooner rather than later. If they are not resolved, they will give rise to suspicion and loss of mutual confidence.

The advantage of reciprocal unilateral measures is that they make the process of reduction easier. A good example is President G. H. W. Bush's announcement on September 27, 1991, that the United States would take unilateral measures to limit and reduce its tactical nuclear weapons arsenal. On October 5 President Mikhail Gorbachev reciprocated with a series of Soviet measures. Those were important steps, and they were taken very quickly, although they did leave a residue of mistrust resulting from different interpretations of what each side had committed itself to do. This suggests that even if the warhead reductions themselves can be carried out through a series of reciprocal unilateral measures, the reductions should be codified in a treaty that clarifies definitions, counting rules, and verification procedures. That will make the agreement more salient politically as well as legally binding, thereby contributing to greater strategic predictability.

39. For a discussion of Reciprocal Unilateral Measures, see George Bunn and David Holloway, *Arms Control without Treaties? Rethinking U.S.-Russian Strategic Negotiations in Light of the Duma-Senate Slowdown in Treaty Approval*, CISAC Working Paper, February 1998.

Moving to Abolition

This paper has outlined some stages by which substantial reductions could be made in nuclear forces, but it has not specified how nuclear weapons could ultimately be eliminated. That omission is intentional. Making substantial reductions within the framework of mutual deterrence presents a number of familiar, even if complicated, issues. Moving to abolition, however, is to travel uncharted territory.[40]

There are some things we can say about a world without nuclear weapons, but how such a world would be organized—what its institutions and norms would be—is best left to be worked out as the process of nuclear disarmament is under way. We do know that it would be a post-nuclear-weapons world, not a pre-nuclear world, and that the knowledge that nuclear weapons could be built would remain, as well as the scientific knowledge and many of the engineering skills and industrial processes. There would inevitably be some degree of nuclear latency, and a world without nuclear weapons would require institutions and norms that would inhibit the use of that latent capacity to break out of the non-nuclear regime and enforce the regime against attempts to break out. What those institutions and norms might be is difficult to specify precisely, but they would surely involve the other elements being studied in this project—controls on fissile materials; internationalization of the fuel cycle; verification and compliance arrangements, etc. Cooperation in dealing with those issues—on both a bilateral and a multilateral basis—should provide the basis for moving beyond low levels of nuclear forces to the elimination of nuclear weapons. That final step to elimination would be taken in circumstances different from those in which we find ourselves today. But

40. For an extensive discussion see Jonathan Schell, *The Abolition* (New York: Knopf, 1984) and Schell, *The Gift of Time: The Case for Abolishing Nuclear Weapons Now* (New York: Metropolitan Books, 1998). See also the report of an independent commission established by the Australian government in 1995: *Report of the Canberra Commission on the Elimination of Nuclear Weapons* (Canberra: August 1995). Accessed at: dfat.gov.au/cc/cc_report_mnu.html.

even if the final shape of a post-nuclear weapons world cannot yet be clearly envisaged, it is important, for reasons given in this paper, to keep at the forefront of our minds the vision of a world without nuclear weapons.