

CHALLENGES AND OPPORTUNITIES FOR RUSSIA-
U.S. NUCLEAR ARMS CONTROL

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A CENTURY FOUNDATION REPORT

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This report is one in a series commissioned by The Century Foundation to explore issues of interest to American policymakers regarding Russia, aimed at identifying a framework for U.S.-Russian relations and policy options for a new administration and Congress that could help right the two countries' troubled relationship at a crucial juncture. The papers in the series explore significant aspects of U.S.-Russian relations, outlining a broad range of reasons why Russia matters for American foreign policy and framing bilateral and multilateral approaches to Russia for U.S. consideration. A high-level working group, co-chaired by Gary Hart, former U.S. senator from Colorado, and Jack F. Matlock, Jr., former U.S. ambassador to the Soviet Union, has provided direction to the project and offered recommendations for action that the United States might take.

The views expressed in this paper are those of the authors. Nothing written here is to be construed as necessarily reflecting the views of The Century Foundation or as an attempt to aid or hinder the passage of any bill before Congress.

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INTRODUCTION

During most of the cold war and for a decade thereafter, negotiations on nuclear arms limitations and reductions were at the center of the Moscow-Washington relationship. These negotiations and the discussions around them created channels of communication between the two governments and kept them open, helped limit their nuclear arms buildups, and made them partners in the great project on reducing the danger of nuclear war. This cooperation and the resulting shared understanding of the dangers of nuclear weapons laid a foundation for the Moscow-Washington partnership in building the nuclear nonproliferation regime.

After the cold war ended, the U.S. government—joined later by its G-7 partners—established Cooperative Threat Reduction programs to help Russia:

- dismantle the strategic nuclear weapons that it had agreed to eliminate under the 1991 Strategic Arms Reduction Treaty (START),
- strengthen the security of Russia's nuclear weapons and materials, and
- employ key scientists in its weapons of mass destruction (WMD) complexes, lest they seek employment from rogue states or terrorist groups.

From 2001 through 2008, the George W. Bush administration opted to keep U.S. nuclear options open. It argued that, with the end of the cold war, nuclear arms control no longer was necessary. As a result, bilateral consultations on the maintenance of strategic stability and negotiations of further reductions practically stopped. The Cooperative Threat Reduction programs were allowed to continue, but they were limited by the Putin administration largely to completing the tasks that already had been undertaken.

Russia and the United States have not become true allies. Indeed, the current sizes of each country's nuclear arsenals can be explained only by the fact that, despite the Clinton-Yeltsin de-targeting agreement,¹ each country views the other's missiles with suspicion. Thus, nuclear deterrence continues to be a central part of the Russian-U.S. relationship, with more than one thousand warheads on each side maintained in a launch-ready alert status in order to maximize the destruction of the other country's nuclear weapons before they can be used if a nuclear exchange should occur. Until this state of tense mutual nuclear deterrence no longer exists, it will be impossible to consider the relationship between Russia and the United States to be "normal."

All this would be bad enough in the world free of other stresses, but there are other stresses—notably stemming from NATO expansion, Russian-U.S. competition for influence in Russia's "near abroad," and the Bush administration's embrace of two technologies that Russia sees as threatening to the deterrent capacity of its nuclear arsenal: ballistic-missile defense and the Prompt Global Strike initiative, featuring intercontinental precision-guided conventional munitions.

Nevertheless, the door appears to be open for Russia and the United States to renew their dialogue on the nuclear danger and reach agreements on how to reduce it—initially on deeper, faster, and irreversible reductions in Russian and U.S. deployed strategic nuclear warheads to levels more consistent with the end of the cold war.² Such agreements will be possible, however, only if the United States treats Russia as a peer and respects its security concerns.

Deep and irreversible cuts in the U.S. and Russian strategic arsenals also are necessary to restore the credibility of the Nuclear Non-Proliferation Treaty (NPT), under which the nuclear-armed states promised to reduce and ultimately eliminate their nuclear weapons in exchange for the non-weapon states agreeing not to acquire nuclear weapons and to allow the International Atomic Energy Agency (IAEA) to monitor their use of nuclear materials. The issue of whether

the nuclear-weapon states have lived up to their NPT commitments is debated with great intensity every five years at the NPT Review Conferences, the next of which will be held in May 2010 at the United Nations.

Among the nuclear-weapon states, Russia and the United States must take the lead in reductions because they still possess between them more than 90 percent of the world's nuclear warheads. There also are other nuclear-arms-control treaties that would strengthen the nonproliferation regime that must be negotiated and ratified on a multilateral basis. Today, the multilateral treaty that is of greatest interest is the Comprehensive Test Ban Treaty (CTBT), which has been negotiated but not yet ratified by all the states necessary to bring it into force. Russia has ratified the CTBT, but the United States has not. Negotiations on a second multilateral treaty—the Fissile Material Cutoff Treaty (FMCT), which would ban the production of additional highly enriched uranium and plutonium for nuclear weapons or explosives—were mandated by the United Nations General Assembly in 1993 but have still not started because of the issue of linkages of the negotiations with negotiations on other nuclear treaties in the Geneva-based Conference on Disarmament (CD). On May 29, 2009, the CD finally agreed on an agenda³ and it is hoped that negotiations will finally begin in early 2010.

We focus below on seven opportunities to advance bilateral Russian-U.S. nuclear arms control and strengthen the global nonproliferation regime:

1. implement deep, irreversible, and verified cuts in the Russian and U.S.-strategic nuclear arsenals;
2. reduce the launch readiness of strategic ballistic missiles in order to reduce the danger of accidental or unauthorized launch;
3. reduce or eliminate their tactical nuclear weapons;
4. reduce stockpiles of fissile materials by declaring more excess in order to make warhead reductions irreversible;
5. assure the survival of the 1987 Intermediate-Range Nuclear

Forces Treaty (INF), which eliminated thousands of medium and intermediate-range missiles from the arsenals of the two countries;

6. focus and limit ballistic missile defense efforts so that they are not seen as a threat to the other country's deterrent; and
7. cooperate more effectively on nuclear nonproliferation and the prevention of nuclear terrorism.

Basically, this agenda is one of resuming the joint Russian-U.S. project of dismantling the cold war doomsday machine and strengthening the nonproliferation regime.

IMPLEMENT DEEP, IRREVERSIBLE, AND VERIFIED CUTS IN THE RUSSIAN AND U.S. STRATEGIC NUCLEAR ARSENALS

Under the 2002 Strategic Offensive Reductions Treaty (SORT), Russia and the United States each will reduce deployed strategic warheads to 2,200 or fewer by the end of 2012. SORT has no verification provisions, however, and START, which does, will expire on December 5, 2009. At that point, the Russian-U.S. strategic relationship will exist in a legal vacuum, and the lack of verification will lead to growing uncertainty about each other's strategic capabilities and intentions.

Because the Bush administration wanted to retain maximum flexibility for future U.S. nuclear forces, SORT does not require elimination of the warheads removed from their delivery vehicles or elimination of de-activated long-range ballistic missiles or their launchers (missile

silos, mobile launchers, and ballistic-missile submarines). Also, SORT expires on the same day its provisions come into force, December 31, 2012, unless it is “extended by agreement of the Parties or superseded earlier by a subsequent agreement.”⁴

Russia repeatedly has expressed an interest in negotiating a new legally binding treaty on further verified reductions of strategic nuclear weapons.⁵ President Obama also has expressed the desire to “seek dramatic reductions in U.S. and Russian stockpiles of nuclear weapons and material.”⁶ Russia and the United States therefore have renewed their strategic dialogue and hope to reach an agreement on a verified follow-on agreement to START by the time it expires or soon thereafter.⁷ Because of the short time-line, the proposed cuts involved will be relatively modest—to 1,675 strategic warheads or less.⁸ An agreement on deeper cuts would have to engage with a broader set of issues, including missile defense and conventional capabilities against strategic nuclear forces because the threshold for a conventional attack would be much lower than for a nuclear attack.

The cuts could be to 1,000–1,200 deployed warheads each, with the excess launchers, missiles, and warheads eliminated.⁹ This may be as far as either country is willing to go without other nuclear-weapon states joining in the reductions—or at least committing verifiably not to build up their nuclear arsenals. The other nuclear-weapon states (China, France, India, Israel, North Korea, and Pakistan) together have about one thousand warheads.

Table 1 shows the numbers of delivery vehicles and deployed warheads attributed to Russian and U.S. strategic forces by the START counting rules as well as nongovernmental estimates of numbers that were actually deployed as of the beginning of 2008. Table 2 gives examples of possible one thousand-warhead forces.

Table 1. Nongovernmental Estimates of Russian and U.S. Strategic Nuclear Forces, 2008 (with numbers obtained using START counting rules in parentheses)

Russian Strategic Forces	Operationally Deployed Missiles or Bombers	Operationally Deployed Warheads
ICBMs (SS-18/19/25/RS-12)	367 (465)	1,248 (2,001)
SLBMs (SS-N-18/20/23/RSM-56)	165 (268)	591 (1,288)
Strategic bombers	76 (76)	844 (608)
Total	608 (809)	2,683 (3,897)
United States Strategic Forces		
ICBM's (Minuteman III)	450 (550)	550 (1,350)
SLBM's (Trident II)	288 (432)	1,152 (3,264)
Long-range bombers	113 (206)	500 (1,052)
Total	851 (1,188)	2,200 (5,916)

Note: The first numbers shown are nongovernmental estimates of actual deployments. The numbers in parenthesis are for START counting rules, under which any missile silo or launch tube is counted as containing a missile until it is destroyed and any missile is counted as carrying a full complement of warheads even if it has been downloaded. (ICBM = intercontinental ballistic missile; SLBM = submarine-launched ballistic missile.)

Sources: Robert Norris and Hans Kristensen, "Russian Nuclear Forces, 2009," *Bulletin of the Atomic Scientists*, May/June 2009; "U.S. Nuclear Forces, 2009," *Bulletin of the Atomic Scientists*, March/April 2009; and START memoranda of understanding of July 1, 2008, <http://www.armscontrol.org/factsheets/sovforces> and <http://www.armscontrol.org/factsheets/usstrat>.

In the notional U.S. one-thousand-warhead force, Minuteman III and Trident II missiles would carry only one and three warheads, respectively, although they were originally designed to carry three and eight, respectively. To make breakout more difficult, it could be agreed that their reentry-vehicle platforms would be destroyed and replaced by new platforms equipped with a reduced number of warhead attachments.¹⁰ A requirement that the downloaded reentry vehicles be destroyed also could be part of such an agreement.

Table 2. Notional Russian and U.S. One Thousand-Warhead Strategic Forces

Russia	Missiles or Bombers	Warheads
Topol ICBMs	160	480
Bulava SLBMs	6x16 launch tubes	384
Blackjack and Bear bombers	17	136
Total	273	1,000
United States		
Minuteman III ICBMs	100	100
Trident II SLBMs	10x24 launch tubes total	720
B-52 bombers with nuclear-armed cruise missiles	18	180
Total	358	1,000

Source: The authors. We have assumed START counting rules for the bombers but have assumed that the U.S. Minuteman III and Trident II missiles are downloaded to one and three warheads, respectively.

The United States has expressed an interest in equipping some of its strategic missiles with conventional warheads for rapid strike against fleeting targets of opportunity, such as a briefly localized Osama Bin Laden. Russia probably would not oppose that—if any such warheads were counted as strategic warheads. The Bush administration insisted, however, that conventional warheads not be counted.¹¹ It appears that the Obama Administration may have abandoned the idea of using strategic ballistic missiles as delivery vehicles for conventional munitions¹² but limiting such weapons will continue to be a priority to Russia.

Russia and the United States each have declared excess a considerable amount of highly enriched uranium and plutonium as a result of their post-cold war warhead reductions—due mostly to the elimination of most of their tactical nuclear weapons. With cuts of their strategic warheads to 1,000 each, they could and should declare more fissile material excess. For a reduction from 10,000 to

1,000 warheads, for example, approximately 36 tons of plutonium and 225 tons of weapon-grade uranium could be declared excess.¹³

***EXTEND THE TRANSPARENCY AND VERIFICATION PROVISIONS
OF THE STRATEGIC ARMS REDUCTION TREATY***

To verify the reductions discussed above, the START transparency provisions should be extended in the START follow-on treaty, with agreed modifications to reduce their complexity and cost.

The G. W. Bush administration argued that START's complex verification procedures reflected the cold war situation of confrontation and suspicion and not the new partnership between the United States and Russia. The administration therefore insisted that SORT not include verification provisions. As a result, if START were allowed to expire without a verified follow-on treaty, Russia and the United States would lose the extensive on-site inspections that they have relied upon to verify each other's declarations of deployed warheads and depend only on their "national-technical means" of verification—that is, satellite and radar observations and communication intercepts. Such means are completely inadequate for verifying some aspects of the reductions, for example, the U.S. downloading of its Minuteman III and Trident II missiles to carry fewer than the number of warheads that they are designed for or the removal of nuclear-armed cruise missiles from designated long-range bomber bases. Given these limitations, major aspects of the SORT reductions would become unverifiable.

Given the continuing level of suspicion between the two countries, most experts believe that verification and transparency measures must continue to play a central role in reducing misunderstandings. The verification arrangements built up by the United States and Soviet Union during the cold war also provide a valuable toolbox for verification of multinational nuclear disarmament and should not be discarded lightly.

While both military establishments want verification to continue after START expires, there are differences in the U.S. and Russian approaches that will have to be bridged. The preference on the U.S. side appears to be for a political agreement to continue as many of the START verification measures as possible. Russia asserts, however, that on-site inspections are illegal in Russia unless they are part of a legally binding agreement.¹⁴

Russia also believes that some verification measures are no longer necessary¹⁵ and would like to eliminate two verification provisions in START that relate to its road-mobile missiles. The application of these provisions is asymmetric because the United States does not possess such missiles. One provision Russia would like to eliminate is the requirement that Russia notify the United States when its road-mobile missiles deploy from and return to their garrisons.¹⁶ The second is the permanent presence of U.S. inspectors at the Votkinsk mobile-missile-production plant to verify the number of road-mobile missiles that Russia produces.¹⁷ These issues will have to be negotiated.

Both governments also have raised questions about the adequacy of reentry-vehicle inspections for some missiles. These inspections are remarkably intrusive in that they require the inspected side to open up a deployed missile that has been selected by the inspecting side to allow its inspectors to verify that the missile carries no more than the declared number of warheads. But the inspected side has a right to place a formfitting cover over the warheads and the platform on which they are mounted before the inspectors are allowed to view them.¹⁸ Russia's inspectors have complained for years that the hard cover used by the U.S. Navy to cover the reentry-vehicles on Trident II submarine-launched ballistic missiles could conceal an additional layer of reentry vehicles.¹⁹ Similar complaints have been made by U.S. inspectors with regard to the hard cover used by Russia during reentry-vehicle inspections of Russia's SS-25 ICBM.

These concerns could be resolved if the inspectors were allowed to use neutron detectors that would allow them to detect the presence of the radioactivity

of the plutonium pits of any additional warheads. Such radiation measurements were developed for the verification of the INF Treaty to distinguish three-warhead SS-20 intermediate-range missiles from single-warhead SS-25 ICBMs. They have already been used to a limited degree in verifying START.²⁰

Finally, START requires the parties not to send telemetry data from their missile tests in encrypted or other difficult-to-intercept form—and also to provide the recorded data to the other country. This allows each side to see whether the missile performance and maneuvers conform with the limits agreed in the treaty. There have been controversies about the interpretation of the data from some tests, however, where the maneuvers observed by tracking radars appeared to be different than those recorded in the telemetry. The telemetry protocol needs to be reviewed to see if these problems can be fixed.

THE QUESTION OF TOTAL NUCLEAR DISARMAMENT

Today, there is renewed interest in the United States in the idea of eliminating all nuclear weapons. This would require the cooperation of at least the nine states that currently possess nuclear weapons. It also would require countries not to see nuclear weapons as the only deterrent to non-nuclear threats to their existence or territorial integrity. Today, countries that depend upon nuclear weapons to deter such threats include Israel, North Korea, Pakistan, and Russia. Even France and the United Kingdom, in the midst of peaceful Western Europe, although they do not currently perceive such threats, invoke the uncertainties of the future as a reason not to give up their nuclear weapons.

There also is the question of whether complete nuclear disarmament could be verified. The uncertainties on the order of 1 percent in the U.S. accounting of the amounts of fissile material that it has produced seems to preclude traditional verification approaches.²¹ One percent of the amount of plutonium and highly enriched uranium that the United States and Russia have produced for nuclear weapons would be enough to produce more than one thousand nuclear warheads. Civilian separation of plutonium from spent power-reactor fuel, for

which currently achievable materials balances also have uncertainties on the order of 1 percent, is compounding this problem.

There is therefore profound skepticism within the Russian and U.S. nuclear establishments about the feasibility of complete nuclear disarmament. There appears to be relatively small resistance, however, to deeper cuts. Russia's ambassador to the United States recently said about nuclear disarmament:

As the ultimate goal, yes, but in order to achieve this goal, a lot of things need to be done. Certainly the lower you go, the more complex the situation becomes. As we go down, we need to be sure that nuclear weapons are not going to appear in other countries. You need to work toward increasing the guarantees of nonproliferation at first. Secondly, we need to have all other [nuclear-armed states] on board. Third, we need to be sure that while we are moving toward this goal, how are the other components of security to be assured? It is complex. It is a very, very complex goal, but it is a noble goal. We can work toward this goal. It has always been our commitment in the nuclear Nonproliferation Treaty, but we need to take first steps first. The first priority for us and probably for you, today, is to decide what is going to follow-on to START. That would be a first step. That is a very good goal that needs to be worked on, I'm afraid, for a quite a long period of time.²²

Indeed, even the former high-level U.S. government officials who have recently endorsed the goal of the elimination of nuclear weapons, when they talk about specifics, describe a step-by-step process with only the near-term steps spelled out.²³

If governments stated the conditions under which they would be willing to commit to total nuclear disarmament, however, that articulation of the ultimate objective could impose a discipline and greatly accelerate the whole nuclear disarmament process. The conditions are likely to include parallel constraints on conventional weapons, especially those of the United States, which today spends more on its military than China, Russia, India, and the United Kingdom combined.²⁴

REDUCE THE LAUNCH READINESS OF STRATEGIC BALLISTIC MISSILES

Two decades after the end of the cold war, the United States and Russia each still keep 1,000–2,000 strategic ballistic-missile warheads on launch-ready alert.²⁵ While normally the risk of launching on false warning is low for both the Russian and U.S. strategic forces, their nuclear early-warning and command-control systems have experienced various malfunctions, including false warnings, and compromised negative controls.²⁶ Fortunately, none of these has yet resulted in a launch. There also is the concern that terrorists might penetrate the electronic command-and-control system and contrive the launch of some of the missiles.²⁷ Reducing the launch readiness of the Russian and U.S. strategic nuclear forces would greatly diminish these dangers. Given that there is no conceivable reason for Russia or the United States to use nuclear weapons against the other, it also would facilitate the qualitative transformation of Russian-U.S. strategic relations to a post-cold war basis.²⁸

In a first step, the two countries could reduce the launch readiness of their submarine-based ballistic missiles and commit not to deploy ballistic-missile submarines provocatively close to each other's territories. Specifically, the United States could declare that its ballistic-missile submarines would not patrol in the North Atlantic, which drastically reduces Russia's warning time, and Russia could declare that the ballistic-missile submarines of its northern fleet would stay in the Arctic and not patrol off the U.S. East Coast as they did, on occasion, during the cold war. Russia could extend this "de-alerting" commitment to its mobile missiles. The United States could increase Russian confidence in the survivability of Russia's ballistic-missile submarines by pledging that it would keep its attack submarines out of Russia's side of Arctic.

If both countries were confident of the survivability of “minimum deterrent” forces with on the order of one hundred warheads, they could reduce the launch-readiness of their silo-based missiles as well. The United States already has such confidence because, at all times, it has about one-third of its strategic-range warheads undetectable on submarines at sea. Russia apparently does not always have ballistic-missile submarines at sea,²⁹ and there may be periods when Russia’s land-mobile missiles are all in their garrisons. This is a matter of choice, however. During a crisis, Russia could send more submarines to sea and mobile missiles into the field.

Given that the United States has such an advantage in the day-to-day survivability of its nuclear forces, it could unilaterally reduce the launch readiness of its nuclear missiles while continuing to send its ballistic-missile submarines to sea to ensure their survivability. It could offer to negotiate verification arrangements to the extent that Russia reciprocated.

A more detailed proposal for staged de-alerting has been put forward by World Security Institute president Bruce Blair.³⁰

REDUCE OR ELIMINATE TACTICAL NUCLEAR WEAPONS

In 1991, Presidents Bush and Gorbachev unilaterally and reciprocally announced that they were eliminating all nuclear weapons deployed with the U.S. and Soviet armies, removing to storage all nuclear weapons from U.S. and Soviet surface ships, and reducing the numbers of tactical nuclear weapons assigned to fighter-bombers. Table 3 (page 16) shows nongovernmental estimates of the numbers of substrategic nuclear warheads in 1991, the numbers eliminated since 1991 as a result of the Bush-Gorbachev Reciprocal Unilateral Initiatives, and the resulting current sizes of the Russian and U.S. nonstrategic nuclear-weapon arsenals. The numbers of warheads eliminated and still deployed in 2008 do not add up to the numbers deployed in 1991 because the estimates are from different sources.

Table 3. Nongovernmental Estimates of Russian and U.S. Substrategic Nuclear Weapons

Warhead Category	Deployed in 1991 ^a	Eliminated since 1991 ^b	Deployed as of 2008	
			Norris <i>et al.</i> ^c	Diakov <i>et al.</i> ^d
Russia				
Land forces: land mines	700	700	0	0
missile forces and artillery	6,000	4,100–5,500	0	0–500 ^e
Navy	5,000	2,800–4,000	698	1000
Air defense	3,000	1,600–1,800	733	500
Tactical aircraft	7,000	2,500–5,000	648	1300
Total	21,700	11,700–17,000	2,079–3,300	
United States				
Army/marine corps	3,040	2,470	0	
Navy	1,150	2,242	100	
Air force	2,975	1,159	400	
Total	7,165	5,871	500 (+790 inactive)	

Sources:

^a *Russia:* A. Arbatov, “Reduction of Non-Strategic Nuclear Arms, Tactical Nuclear Weapons,” *Nuclear Arms and Security of Russia*, A. Arbatov, ed., Moscow, IMEMO RAN, 1997, pp. 51–57; *U.S.:* Joshua Handler, “The 1991–1992 Presidential Nuclear Initiatives (PNIs) and the Elimination, Storage, and Security of Tactical Nuclear Weapons,” *Tactical Nuclear Weapons*, Brian Alexander and Alistair Miller, eds. (Dulles, Va.: Brassey’s, 2003), Table 2.9.

^b Based on Handler, “The 1991–1992 Presidential Nuclear Initiatives,” Table 2.2, assuming that 300 U.S. W-79 artillery shells were subsequently dismantled.

^c Robert Norris and Hans M. Kristensen, “Russian Nuclear forces, 2008,” *Bulletin of the Atomic Scientists*, May/June 2008.

^d Anatoli Diakov, Eugene Miasnikov, and Timur Kafyshev, “Non-Strategic Nuclear Weapons: Problems of Control and Reduction,” Center for Arms Control, Energy and Environmental Studies, Moscow Institute of Physics and Technology, 2004, http://armscontrol.ru/pubs/en/nsnw_en_v1b.pdf.

^e The elimination of all Russian nonstrategic nuclear weapons for land forces was to have been completed by 2004, but there has been no official announcement. Presentation by Russia’s delegation on Russia’s actions toward fulfillment of Article VI of the NPT at the 2005 NPT Review Conference, April 11, 2002, reprinted in the *Information Bulletin of the Russian Ministry of Foreign Affairs*, April 22, 2002.

The United States still has a few hundred nuclear bombs deployed on fighter-bomber airbases in Belgium, Germany, Italy, the Netherlands, and Turkey—roughly half assigned to U.S. fighter-bombers and half to host-country fighter-bombers.³¹ Today, these are the only nuclear weapons that any country has deployed on the soil of another country. Their withdrawal to the United States has often been recommended by Russian analysts as a first step in bilateral reductions.

In fact, the United States gradually has been removing its nuclear weapons from Europe. They were removed from Greece in 2001 and from the United Kingdom in 2008.³² In Belgium, Germany, the Netherlands, and Turkey, the number of airbases at which U.S. nuclear weapons are stored has been reduced to one in each country. Italy still has two.³³ Outside the NATO bureaucracy—and perhaps the Turkish government—there does not seem to be a strong constituency for keeping U.S. nuclear weapons in Europe except as a symbol of the U.S. commitment to the defense of Europe. The fact that the United States was able to withdraw its nuclear weapons from South Korea in 1991, however, without destabilizing that defense relationship suggests that a similar formula might be found for NATO.

The United States also has perhaps one hundred non-deployed nuclear-armed cruise missiles that could be redeployed on attack submarines.

Russia reportedly has kept a larger number of substrategic nuclear bombs and warheads for fighter-bombers, ships, submarines, and anti-aircraft and antimissile missiles. While Russia has declared its readiness to negotiate reductions of nonstrategic nuclear weapons, its negotiations on this issue would take into account Russia's general military strategic situation and the power of its conventional forces relative to those of its potential adversaries.³⁴ Some Russian experts believe that, because of Russia's geostrategic position and NATO's incorporation of the East European states and some former Soviet republics, Russia cannot guarantee its security without nonstrategic nuclear weapons.³⁵ Russia's many nonstrategic naval nuclear weapons

may similarly reflect its perception of inferiority in conventional weaponry relative to U.S. carrier battle groups.

It is not clear, however, why Russia and the United States each keep two types of air-delivered nuclear weapons: cruise missiles and bombs, and also why they keep nuclear weapons for both long-range bombers and fighter-bombers. Long-range bombers equipped with long-range cruise missiles should be more than enough for any contingency. If so, why not eliminate all nuclear bombs and shorter-range nuclear-armed cruise missiles?

If long-range, nuclear-armed, sea-launched cruise missiles were eliminated as well, the result would be the complete elimination of all U.S. sub-strategic nuclear weapons. Russia would still have, however, nuclear warheads for anti-aircraft and anti-missile interceptors and for a variety of naval anti-submarine, anti-ship, and anti-aircraft weapons. One nongovernmental source puts two-thirds of Russian tactical nuclear weapons into these categories.³⁶ Precision conventional weapons could replace at least some of these weapons, as has happened for most classes of U.S. tactical nuclear weapons. If the United States were willing to withdraw its sub-strategic nuclear weapons from Europe, it should therefore be possible for Russia to reduce its stockpile of non-strategic nuclear bombs and warheads greatly, even if it does not eliminate them entirely.

Rose Gottemoeller, current U.S. assistant secretary of state for verification, compliance, and implementation, has suggested that Russia and the U.S.-NATO focus initially on transparency and the reduction and elimination of sub-strategic forces in Europe. This would leave for later the issue of Russia's sub-strategic nuclear weapons in Asia, where Chinese, Indian, and Pakistani weapons also could be involved.³⁷ Russia and the United States currently keep their non-strategic warheads entirely or almost entirely in storage. This should make verification arrangements for declarations relatively straightforward.

REDUCE STOCKPILES OF FISSILE MATERIALS BY DECLARING MORE EXCESS

As a result of their reductions of their nuclear stockpiles by more than ten thousand warheads each, Russia and the United States have declared excess for weapon use huge quantities of plutonium and highly enriched uranium (HEU). They are disposing of the excess HEU in nuclear power reactor fuel or shifting it into stockpiles reserved for future use as naval-reactor fuel (see Table 4).

Table 4. Fissile Materials Declared Excess and Estimated Remaining in the Military Stockpiles as of Mid-2008
(metric tons)

Russia	Declared Excess	Naval Reserve	Estimated remaining in Weapon Complex
HEU (highly enriched uranium)	500	≈100?	600 ± 300
Plutonium	34–50		95 ± 25
United States			
HEU	233	128	250
Plutonium	54		38

Note: Roughly speaking, ten tons of plutonium is sufficient to make 2,500 warheads, and one hundred tons of weapon-grade (90 percent enriched) HEU is sufficient to make 4,000 warheads.

Source: *Global Fissile Material Report 2008*, (Princeton, N.J.: International Panel on Fissile Materials, 2008) Figures 1.3 and 1.8.

Given the continuing reductions in their nuclear-weapon stockpiles, both countries should declare additional amounts of fissile materials excess and announce how they plan to dispose of them.

The United States has made public the total amounts of plutonium and HEU in its stockpiles so that there is a fairly accurate estimate of how much

it has left in its weapon stocks.³⁸ The U.S. stockpile of weapons material is currently enough to support about ten thousand warheads. There has been no apparent damage to U.S. security as a result of revealing of this information.

In Russia's case, however, we have only very uncertain nongovernmental estimates. Russia should, like the United States, reveal the size of its total stockpiles of fissile materials reserved for weapons, naval-reactor, and civilian use. The numbers need not be exact. Total stockpiles of military HEU and plutonium rounded to the nearest hundred and ten tons, respectively, would be sufficient at this point. At the moment, however, Russia appears to have no interest in making such declarations.

If Russia's stocks turn out to be much larger than those of the United States—as the numbers in Table 4 suggest—it has room to make much larger reductions. Russia's agreement in 1993 to eliminate five hundred tons of highly enriched uranium without the United States making an equal commitment was motivated by the income that was realized by the opportunity to sell the blended down HEU to the United States for power-reactor fuel.³⁹ There have been a number of efforts to devise economic incentives to motivate Russia to eliminate additional excess HEU, but thus far there has been no positive response.

ASSURE THE SURVIVAL OF THE 1987 INTERMEDIATE-RANGE NUCLEAR FORCES TREATY

The 1987 Intermediate-Range Nuclear Forces Treaty eliminated over 2,600 Soviet and U.S. land-based nuclear missiles with ranges between 500 and 5,500 kilometers.⁴⁰ In response to the Bush administration's 2002 withdrawal from the Anti-Ballistic Missile (ABM) Treaty and the proposed deployment of missile interceptors in Poland, however, Moscow was reportedly "contemplating withdrawal from the 1987 INF Treaty."⁴¹

In October 2007, President Putin suggested, as an alternative to Russian withdrawal, converting the bilateral U.S.-Russian INF Treaty into global treaty. In his view, it will be difficult for Russia to remain bound by the treaty's ban on intermediate-range missiles if its neighbors, including China, India, Israel, and Iran, are deploying medium- and intermediate-range missiles. Putin therefore proposed that these countries too become parties to the INF Treaty—indeed, that it be globalized.⁴² President Obama has embraced the “goal to expand the U.S.-Russian ban on intermediate-range missiles so that the agreement is global.”⁴³

Russia's neighbors with medium- and intermediate-range missiles have few and, in some cases, no missiles with ranges greater than 5,500 kilometers, however. It therefore appears unlikely that they would join in a globalized INF Treaty.

Does this mean that the INF Treaty is doomed? Probably not—especially after the Obama administration's decision in September 2009 to scrap its predecessor's plan to deploy U.S. missile interceptors in Poland.⁴⁴

FOCUS AND LIMIT BALLISTIC-MISSILE DEFENSE EFFORTS

In 2002, the Bush administration withdrew the United States from the 1972 U.S.-Soviet/Russia Treaty on Limitation of Anti-Ballistic Missile Systems, the ABM Treaty. Subsequently, the Bush administration began to deploy interceptors for strategic-range missiles in Alaska and California and proposed to do so in Poland as well. The systems are said to be directed against possible future threats from North Korea and Iran, but Russia and China doubt that these countries will have the technical capability to launch an intercontinental ballistic missile attack on the United States in the foreseeable future. They suspect that a real purpose of the U.S. ABM systems is to attempt to obtain a strategic advantage over Russia and China by creating a threat to

their deterrents—especially if the proposed deployments are later expanded. Despite statements by the Bush administration describing these concerns as baseless, some independent U.S. analysts gave them credence.⁴⁵

Russia's strong reaction to the Bush administration's proposed missile deployment in Poland must be understood in the context of the apparent relentless expansion of NATO to Russia's borders despite then-secretary of state James Baker's alleged promise to Gorbachev in 1990 that, if Germany was allowed to reunite, NATO would not move east.⁴⁶

In June 2007, President Putin offered the United States the use of existing Russian missile-defense radars in Azerbaijan and southern Russia as an alternative to the tracking radar the United States proposed to deploy in the Czech Republic. He also suggested that the United States base its interceptors closer to Iran—in Turkey, for example. There they would be unable to threaten to intercept Russia's ICBMs.⁴⁷

There is a need for a joint and objective Russian-U.S. analysis of the potential ballistic missile threat from Iran and other “third countries” and of the need and likely effectiveness of different possible responses. These responses would preferably be diplomatic but, if necessary, could include fast boost-phase interceptors located nearby. Because interceptor missiles can travel less than one thousand kilometers during the three-to-five-minute-long boost phase of an ICBM, boost-phase interceptors based outside of its borders would not be able to reach deep into the interior of a large country such as Russia and therefore should be seen as less threatening to its deterrent. Mid-course interceptors can in any case be neutralized by light-weight decoys, which could be used to multiply one hundred fold the number of “warheads” that would have to be intercepted.⁴⁸

Currently, the U.S. antimissile effort is ground and sea-based. Since before the Reagan administration's “Star Wars” program of the mid-1980s, however, there has also been interest within the U.S. military establishment in placing weapons in space for multiple purposes, including missile defense, satellite attack, and prompt ground attack. Both Russia and China are quite concerned

about these possibilities and have been trying to preempt them with a treaty on Prevention of an Arms Race in Outer Space (PAROS). The U.N. General Assembly's First Committee approved a resolution in favor of prevention of an arms race in outer space at the end of October 2008, with the United States casting the only negative vote.⁴⁹ In the beginning of 2008, Russian and China submitted to the Conference on Disarmament a draft treaty on the prevention of the placement of weapons in outer space or the threat or use of force against outer space objects.⁵⁰

Since any maneuverable object in outer space, including satellites, could, in principle, be used to attack another space object, it might not be possible to ban weapons in outer space altogether, but a ban on interception tests against objects in orbit should be feasible.⁵¹ The Obama administration has launched a review of U.S. national space policy.⁵² It should rescind the portion of the 2006 executive statement of U.S. national space policy that asserts that

The United States will oppose the development of new legal regimes or other restrictions that seek to prohibit or limit U.S. access to or use of space. Proposed arms control agreements or restrictions must not impair the rights of the United States to conduct research, development, testing, and operations or other activities in space for U.S. national interests.⁵³

In any case, despite the arguments of enthusiasts that space would be the "high ground" in future wars, weapons in space would be extremely costly in comparison to ground and sea-based weapons. If one wanted to have a weapon available at all times near specific ground targets or launchers for missile boost-phase interception, one would have to have more than a thousand such weapons in orbit.⁵⁴ Compounding the tremendous cost of such a constellation would be the fact that these weapons would be much more vulnerable to a preemptive attack in space than if they were in ground-based silos or on ground- or sea-mobile launchers.

COOPERATE MORE EFFECTIVELY ON NUCLEAR NONPROLIFERATION AND THE PREVENTION OF NUCLEAR TERRORISM

Moscow and Washington were partners in the crafting of the 1970 NPT and continue to have a common interest in limiting the spread of nuclear weapons to other countries.

Today, probably the most important thing that the two could do together to strengthen the nonproliferation regime would be to act as if they believed that the threat of use of nuclear weapons were not an option except to deter nuclear use by other countries and if they committed to a systematic approach to the reduction and eventual elimination of nuclear weapons. The 2005 NPT Review Conference collapsed after the Bush administration refused even to acknowledge commitments made by the United States and the other NPT nuclear-weapon states at the 1995 NPT Review and Extension Conference and at the year-2000 NPT Review Conference to move toward nuclear disarmament. It is critical that the May 2010 NPT Review Conference result in an agreement that would be more encouraging to non-weapon states' hopes for reducing the nuclear threat.

The commitments made by the NPT weapon states at the 1995 and 2000 NPT Review Conference were listed in the so-called 13 practical steps (see Box 1). The first three items on this list relate to the need to bring the Comprehensive Test Ban Treaty (CTBT) into force and to negotiate a Fissile Material Cutoff Treaty (FMCT) that would produce a verifiable end to the production of plutonium and highly enriched uranium for weapons. Here, the United States must take the lead because it was the United States that blocked progress during the Bush administration. (Since Russian-U.S. cooperation is not central in this case, the discussion of bringing the CTBT into force appears in the Appendix, page 32.)

The other steps are still a good set of principles to guide nuclear disarmament and overlap to a large extent with the points made in the discussion

above on U.S.-Russian nuclear arms reductions. Only step seven would require rewording because of the Bush administration's withdrawal of the United States from the ABM Treaty, which resulted in Russia's non-ratification of START II and the Bush administration's substitution of the unverified SORT for START III, which would have included transparency and reductions of stocks of strategic warheads.

Box 1. The Thirteen “Practical Steps” toward Nuclear Disarmament Committed to by the Five NPT Weapon States (the United States, Russia, the United Kingdom, France, and China) at the Year-2000 NPT Review Conference (paraphrased)

1. Sign and ratify the Comprehensive Test Ban Treaty (CTBT) without delay and without conditions to achieve early entry into force of the treaty;
2. agree not to test nuclear weapons pending entry into force of the CTBT;
3. negotiate a verifiable ban on the production of fissile materials for nuclear weapons that meets both nuclear disarmament and nonproliferation objectives;
4. support the establishment of a body responsible for negotiating nuclear disarmament;
5. agree that nuclear reductions and disarmament will be irreversible;
6. totally eliminate their nuclear arsenals;

7. pursue early entry into force of START II and the conclusion of START III as soon as possible while preserving and strengthening the ABM Treaty as a cornerstone of strategic stability;
8. implement the Trilateral Initiative under which the IAEA would monitor U.S. and Russian plutonium and HEU declared excess for military purposes even while the material is still in weapon components;
9. introduce unilateral initiatives to reduce tactical and strategic nuclear weapons, increase transparency about nuclear arsenals, reduce operational alert levels and roles for nuclear weapons, and join the process of reducing and eliminating nuclear weapons;
10. place fissile material declared excess for military purposes under IAEA or other international monitoring and use it only for peaceful purposes;
11. reaffirm the objective of general and complete disarmament under effective international control;
12. report regularly their progress towards implementing their commitment to nuclear disarmament under Article VI of the NPT; and
13. further develop capabilities to verify compliance with disarmament agreements.

Source: Sixth NPT Review Conference, Briefing no. 18, May 20, 2000, including the Conference Agreement on a Programme of Action (Next Steps) on Nuclear Disarmament, <http://www.acronym.org.uk/npt/npt18.htm>.

Strengthening the credibility of the nonproliferation regime is not a panacea, however, for the world's nonproliferation problems. There are always crises relating to the nuclear programs and intentions of particular countries. Today, the focus is on North Korea, Iran, and the spread of nuclear energy.

North Korea (the DPRK) renounced its adherence to the NPT in 2003 and separated more than thirty kilograms of plutonium and tested a nuclear weapon in 2006 and again in 2009. Russia and the United States have worked together in the Six-Party Talks (the United States, North Korea, China, Japan, Russia, and South Korea) but the DPRK is still a long way from complying with its 2005 agreement to eliminate its nuclear-weapon program.

Russia and the United States have been working together on Iran as well, along with France, Germany, the United Kingdom, and other countries. Russia was opposed to using military force and more reluctant to ramp up sanctions than the Bush administration, but the two countries did work together. It is likely that Russia will continue to work on this problem with the Obama administration.

The Iran problem reflects a larger problem with the current nuclear-energy regime, however. Iran claims—with support from many other countries—that, under Article IV of the NPT, it has an “inalienable right” to a national uranium-enrichment plant. In fact, Article IV does provide an inalienable right to the peaceful use of nuclear technology. The debate with regard to Iran is whether its intentions are peaceful or not.

The problem is that intentions are difficult to ascertain and can, in any case, change. As was recognized in the 1946 Acheson-Lilienthal report, enrichment and reprocessing technologies are “dangerous,” because they can be used to produce respectively highly enriched uranium or separated plutonium for weapons quickly.⁵⁵ The Acheson-Lilienthal report therefore recommended that these facilities be placed under the ownership of an International Atomic Development Authority.

The cold war prevented the creation of such an international institution, and today there are nine weapon states that have reprocessing and/or enrichment plants. In addition, one non-weapon state (Japan) has a reprocessing plant and five (Brazil, Germany, Iran, Japan, and the Netherlands) have enrichment plants. Moreover, there are additional countries interested in acquiring them.

In response to the Iran crisis, various proposals have been made for alternatives to national enrichment plants. President Bush proposed in 2004 that the weapon states and Japan supply enrichment and reprocessing services to the rest of the world.⁵⁶ IAEA Director General Mohamed ElBaradei proposed that such facilities be placed under multinational control and that there be various forms of supply guarantees to non-nuclear-weapon states that do not have national fuel-cycle facilities and are in compliance with the NPT.⁵⁷

Russia has been supportive of ElBaradei's proposals to the extent of establishing a multinational company to provide enrichment services and also a "bank" of low-enriched uranium to be made available to any country whose enrichment contracts are not honored for political reasons unrelated to proliferation concerns. Iran has expressed a willingness to have other countries become co-owners of its Natanz enrichment plant but has not been interested in any alternative to having an enrichment plant on its own territory. Other countries have been interested in Russia's proposal, however, starting with Kazakhstan.⁵⁸ In the United States, three out of four of the new enrichment plants that are being built are multinational with regard to investors and/or using foreign technology. How to optimize such arrangements to make them maximally proliferation resistant has not been explored. Doing so is urgent, however, in view of the fact that tens of additional countries have expressed an interest in acquiring nuclear power reactors.⁵⁹

PREVENTING NUCLEAR TERRORISM

After the end of the cold war, the United States and Russia launched a number of cooperative threat reduction programs motivated in part by the need

to ensure that the former Soviet Union did not become a source of nuclear materials for would-be nuclear terrorists. This program, which is still in place, had a number of elements, including strengthening the security of nuclear-weapons and materials, eliminating excess fissile material, and offering contracts to underemployed nuclear-weapon scientists to work on non-weapon research and development.

These programs provided revenue and jobs for Russia's nuclear weapons laboratories and production facilities at a time when the Russian economy was depressed and funds from Moscow had been cut. Central control over Russia's nuclear establishment was relatively weak at the time, and under President Yeltsin, there was a spirit of openness between the Russian and U.S. nuclear weapon laboratories that facilitated such cooperative activities.

Today, the situation has changed. Russia's economy recovered (at least until the recent global financial crisis) as did federal support for its nuclear establishment. Moreover, the Putin-Medvedev administrations have been dominated by former intelligence operatives who are uncomfortable about U.S. visitors in sensitive Russian nuclear facilities—especially in the absence of reciprocal access for Russians at the corresponding U.S. facilities. As a result, the U.S. Cooperative Threat Reduction programs in Russia appear to be winding down.

It is not clear, however, that the Russian government is giving priority to reducing the number of facilities where weapon-usable fissile material may be found or even to maintaining the security improvements that have been made as a result of the Cooperative Threat Reduction Program.

An important area where a great deal of work remains to be done in Russia is shutting down and decommissioning unneeded HEU-fueled research reactors and conversion to low-enriched uranium (LEU) fuel of as many of those reactors that are kept as possible. This is of special concern because it is easy to make nuclear explosives with the mostly weapon-grade uranium used to fuel most of these reactors. Russia and the United States have been cooperating

in converting research reactors to LEU, but Russia insisted in the statement issued from the Bush-Putin 2005 Summit meeting in Bratislava endorsing this program that the cooperation would be limited to “third countries.”⁶⁰

Unlike the United States, Russia has not mounted an effort to shutdown or convert its own HEU-fueled reactors. As a result, today, Russia still has about sixty HEU-fueled research reactors, or about half the world’s total.⁶¹ The Obama administration has expressed an interest in cooperating in dealing with such potential sources of material for nuclear terrorism. Given the centralization of the current Russian regime, it will have to pursue this issue at the highest government levels.

CONCLUSION

Two decades after the end of the cold war, nuclear weapons are still central to the Russian-U.S. relationship. It is unthinkable that the Russian or U.S. governments would use these weapons deliberately, but they nevertheless put their owners and the rest of the world in great danger. The stockpiles have been reduced from tens of thousands of warheads to less than ten thousand each, but they are still vastly in excess of any post-cold war deterrent need. The Russian and U.S. stockpiles of strategic warheads—including non-deployed warheads—could be reduced to one thousand each and their nonstrategic warhead stockpiles to a few hundred or zero before the stockpiles of other nations would have to be taken into account.

Achieving these reductions and other actions such as reducing the launch readiness of strategic ballistic missiles, eliminating most or all tactical nuclear weapons, declaring more nuclear-weapon material excess, limiting ballistic-missile defenses, bringing the Comprehensive Test Ban Treaty into effect, and negotiating a Fissile Material Cutoff Treaty could revive hope that the nuclear disarmament promise in Article VI of the NPT ultimately could be realized.

The realization of that hope, however, lies beyond the current nuclear-arms-control horizon. It depends upon all countries being willing to give up nuclear weapons as a deterrent to non-nuclear threats. It also depends upon a reduced threat environment allowing significant relaxation of cold war standards of verification. Nevertheless, a commitment to the goal of eliminating all nuclear weapons and agreeing on the conditions under which such a goal could be achieved would greatly accelerate its realization.

Russia, the United States, and other governments also must cooperate so that the spread of nuclear power—which the nuclear industries of several countries are promoting enthusiastically—not be accompanied by a spread of national reprocessing and enrichment plants, which can be used to produce plutonium or highly enriched uranium for weapons. Guaranteed fuel services and multinational facilities are a preferable alternative.

The relationship between Moscow and Washington has deteriorated since the days when George Bush Senior and Mikhail Gorbachev committed to START and the elimination of the bulk of their countries' nonstrategic nuclear weapons. But we see no political reason why the capitals could not resume their cooperation on nuclear reductions and nonproliferation and make large further steps toward nuclear disarmament. Russia has been waiting for a U.S. administration with which to continue nuclear arms negotiations. Although currently distracted by multiple crises, President Obama is personally very interested in this agenda. Great progress could be made during the next few years. It is important that a good start be made before the May 2010 NPT Review Conference.

APPENDIX: BRINGING THE COMPREHENSIVE TEST BAN TREATY INTO FORCE

As of the end of October 2009, 182 countries had signed the CTBT and 144 had ratified it. It only comes into force, however, when ratified by all 44 countries on a 1996 IAEA list of countries having nuclear power and/or research reactors. Thus far, 35 of the 44 countries, including Russia, have ratified.⁶² The nine remaining states whose ratifications are required are: China, Egypt, India, Indonesia, Iran, Israel, North Korea, Pakistan, and the United States.

Among the holdout states, the United States is key. It is almost certain that China, Indonesia, Israel, and North Korea would ratify if the United States did.⁶³ Egypt and Iran, as NPT non-weapon states, would lose their strongest argument against ratification if Israel ratified. And India and Pakistan would be unlikely to resist international pressure to ratify if they remained the only holdouts.

For a treaty to be ratified by the United States, an affirmative vote by a two-thirds majority of the Senators present is required. In October 1999, toward the end of the Clinton administration, less than half of the Senate voted for ratification in a largely party-line vote: Republicans against and Democrats for.

Contrary to the expectation of some of its officials,⁶⁴ however, the G.W. Bush administration did not move to break the testing moratorium that had begun at the end of the administration of the senior George Bush. Instead, a bipartisan view formed that the Science-based Stockpile Stewardship Program that had been developed by the Clinton administration as a way to maintain confidence in the reliability of the U.S. nuclear stockpile without testing was working remarkably well. The detection of North Korea's sub-kiloton October 2006 test at great distances also increased the credibility of the CTBT's verification system.

With the election of pro-CTBT President Obama and the increase of the size of the Democratic majority in the Senate, prospects of CTBT ratification seem much improved. Obtaining a two-thirds majority vote is still a daunting challenge, however, and, with many other pressing challenges facing him,

President Obama may be reluctant to push for ratification at the beginning of his term. If he does not ask the Senate for ratification before the May 2010 NPT Review Conference, he will have to move early and in a convincing way toward deep nuclear cuts.

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58. "Enrichment Capacity at Angarsk to Be Boosted," World Nuclear News, June 25, 2007, <http://www.world-nuclear-news.org/newsarticle.aspx?id=13604>.

59. See also James Goodby, "Internationalizing the Nuclear Fuel Cycle," *Bulletin of the Atomic Scientists*, September 4, 2008, <http://www.thebulletin.org/web-edition/features/internationalizing-the-nuclear-fuel-cycle>.

60. "Bush, Putin Pledge Enhanced Nuclear Security Cooperation: Joint Statement Issued in Conjunction with Summit in Slovakia," February 24, 2005, <http://www.america.gov/st/washfile-english/2005/February/200502241401561CJsamohT0.2700464.html>. More recently, the Medvedev-Obama joint summit statement of July 6, 2009, included language that indicated a willingness on the part of Russia at least to explore the conversion of its HEU-fueled research reactors: "We will continue cooperating on development of new types of low-enriched uranium (LEU) fuel for possible conversion of research reactor cores in third countries and on conducting feasibility studies to explore possibilities for conversion of such individual reactors in the United States and Russia."

61. *Global Fissile Material Report 2007* (Princeton, N.J.: International Panel on Fissile Materials, 2007), Table 1.3, http://www.fissilematerials.org/ipfm/site_down/gfmr07.pdf.

62. "The Status of the Comprehensive Test Ban Treaty: Signatories and Ratifiers," Arms Control Association, February 2008, <http://www.armscontrol.org/factsheets/ctbtsig>.

63. For the positions of China and Indonesia, see statements by H. E. Ambassador Shen Guofang, head of the Chinese delegation (http://new.fmprc.gov.cn/ce/ceun/eng/chinaandun/disarmament_armscontrol/npt/t29291.htm), and Ambassador Makmur Widodo, head of the delegation of the Republic of Indonesia (<http://www.un.org/web-cast/ctbt/statements/indonesiaE.htm>), at the 2nd Conference on Facilitating the Entry into Force of the Comprehensive Nuclear-Test-Ban Treaty. Israel has participated actively and constructively in the development of procedures for on-site inspections when a test is suspected, and according to Israeli officials, Israel expects to ratify the CTBT when the U.S. does. Indeed, the G.W. Bush administration may have pressured Israel *not* to ratify the CTBT. It is foolhardy to try to predict North Korea's diplomatic actions but being a holdout on ratifying the CTBT would be inconsistent with that country's commitment to rejoin the NPT as a non-weapon state.

64. Jace Radke, "Defense Official: Nuke Tests at NTS [Nevada Test Site] Are Likely," *Las Vegas Sun*, August 14, 2002, <http://www.lasvegassun.com/news/2002/aug/14/defense-official-nuke-tests-at-nts-are-likely/>.

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