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## Nonstrategic Nuclear Weapons

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# Nonstrategic Nuclear Weapons

## Summary

During the Cold War, the United States and Soviet Union both deployed thousands of “nonstrategic” nuclear weapons that were intended to be used in support of troops in the field during a conflict. These included nuclear mines; artillery; short, medium, and long-range ballistic missiles; cruise missiles; and gravity bombs. In contrast with the longer-range “strategic” nuclear weapons, these weapons had a lower profile in policy debates and arms control negotiations. At the end of the 1980s, before the demise of the Soviet Union, each nation still had thousands of these weapons deployed with their troops in the field, aboard naval vessels, and on aircraft.

In 1991, both the United States and Soviet Union announced that they would withdraw most and eliminate many of their nonstrategic nuclear weapons. The United States now retains approximately 1,100 nonstrategic nuclear weapons, with a few hundred deployed with aircraft in Europe and the remaining stored in the United States. Estimates vary, but experts believe Russia still has between 3,000 and 8,000 warheads for nonstrategic nuclear weapons in its arsenal. The Bush Administration has not announced any further reductions in U.S. nonstrategic nuclear weapons; to the contrary, it has indicated that nuclear weapons remain essential to U.S. national security interests and it has requested funding for the study of a new robust nuclear earth penetrator weapon. In addition, Russia has increased its reliance on nuclear weapons in its national security concept. Some analysts argue that Russia has backed away from its commitments from 1991 and may develop and deploy new types of nonstrategic nuclear weapons.

Analysts have identified a number of issues with the continued deployment of U.S. and Russian nonstrategic nuclear weapons. These include questions about the safety and security of Russia’s weapons and the possibility that some might be lost, stolen, or sold to another nation or group; questions about the role of these weapons in U.S. and Russian security policy, and the likelihood that either nation might use these weapons in a regional contingency with a non-nuclear nation; questions about the role that these weapons play in NATO policy and whether there is a continuing need for the United States to deploy these weapons at bases overseas; and questions about the relationship between nonstrategic nuclear weapons and U.S. nonproliferation policy, particularly whether a U.S. policy that views these weapons as a militarily useful tool might encourage other nations to acquire their own nuclear weapons, or at least complicate U.S. policy to discourage such acquisition.

Some argue that these weapons do not create any problems and the United States should not alter its policy. Others, however, argue that the United States should reduce its reliance on these weapons and encourage Russia to do the same. Many have also suggested that the United States and Russia expand their efforts to cooperate on ensuring the safe and secure storage and elimination of these weapons, possibly to include negotiating a formal arms control treaty that would limit these weapons and allow for increased transparency in monitoring their deployment and elimination.

This report will be updated as needed.

## Contents

Introduction .....	1
The Distinction Between Strategic and Nonstrategic Nuclear Weapons .....	4
Definition by Observable Capabilities .....	4
Definition by Exclusion .....	5
U.S. and Soviet Nonstrategic Nuclear Weapons .....	6
U.S. Nonstrategic Nuclear Weapons During the Cold War .....	6
Strategy and Doctrine .....	6
Force Structure .....	7
Soviet Nonstrategic Nuclear Weapons During the Cold War .....	8
Strategy and Doctrine .....	8
Force Structure .....	8
The 1991 Presidential Nuclear Initiatives .....	9
U.S. Initiative .....	9
Soviet and Russian Initiatives .....	10
U.S. Nonstrategic Nuclear Weapons after the Cold War .....	11
Strategy and Doctrine .....	11
Force Structure .....	13
Russian Nonstrategic Nuclear Weapons after the Cold War .....	15
Strategy and Doctrine .....	15
Force Structure .....	16
Changing the Focus of the Debate .....	18
Issues for Congress .....	19
Issues .....	19
Safety and Security of Russian Nonstrategic Nuclear Weapons .....	19
The Role of Nonstrategic Nuclear Weapons in Russia's National Security Policy .....	19
The Role of Nonstrategic Nuclear Weapons in U.S. National Security Policy .....	20
The Role of Nonstrategic Nuclear Weapons in NATO Policy and Alliance Strategy .....	21
The Relationship Between Nonstrategic Nuclear Weapons and U.S. Nonproliferation Policy .....	21
Policy Options .....	22
Status Quo .....	22
Reduce Reliance on Nuclear Weapons .....	23
Cooperative Responses .....	24

# Nonstrategic Nuclear Weapons

## Introduction

During the Cold War, nuclear weapons were central to the U.S. strategy of deterring Soviet aggression against the United States and U.S. allies. Towards this end, the United States deployed a wide variety of systems that could carry nuclear warheads. These included nuclear mines; artillery; short, medium, and long range ballistic missiles; cruise missiles; and gravity bombs. The United States deployed these weapons with its troops in the field, aboard aircraft, on surface ships, on submarines, and in fixed, land-based launchers. The United States articulated a complex strategy, and developed detailed operational plans, that would guide the use of these weapons in the event of a conflict with the Soviet Union and its allies.

Most public discussions about U.S. and Soviet nuclear weapons — including discussions about perceived imbalances between the two nations' forces and discussions about the possible use of arms control measures to reduce the risk of nuclear war and limit or reduce the numbers of nuclear weapons — have focused on long-range, or strategic, nuclear weapons. These include long-range land-based intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missiles (SLBMs), and heavy bombers that carry cruise missiles or gravity bombs. These were the weapons that the United States and Soviet Union deployed so that they could threaten destruction of central military, industrial, and leadership facilities in the other country — the weapons of global nuclear war. But both nations also deployed thousands of nuclear weapons outside their own territories with their troops in the field. These weapons usually had less explosive power and were deployed with launchers that would deliver them to shorter ranges than strategic nuclear weapons. They were intended for use by troops on the battlefield or within the theater of battle to achieve more limited, or tactical, objectives.

These “nonstrategic” nuclear weapons did not completely escape public discussion or arms control debates. Their profile rose in the early 1980s when U. S. plans to deploy new cruise missiles and intermediate-range ballistic missiles in Europe, as a part of NATO's nuclear strategy, ignited large public protests in many NATO nations. Their high profile returned later in the decade when the United States and Soviet Union signed the 1987 Intermediate Range Nuclear Forces (INF) Treaty and eliminated medium and intermediate range ballistic and cruise missiles. Then, in 1991, President George Bush, and Soviet President Mikhail Gorbachev, each announced that they would withdraw from deployment most of their nonstrategic nuclear weapons and eliminate many of them.

These 1991 announcements, coming in the months before the December 1991 collapse of the Soviet Union, responded to growing concerns about the safety and security of Soviet nuclear weapons at a time of growing political and economic

upheaval in that nation. It also allowed the United States to alter its forces in response to easing tensions and the changing international security environment. Consequently, for many in the general public, these initiatives appeared to address and *solve* the problems associated with nonstrategic nuclear weapons. Moreover, although the United States and Russia included these weapons in some of their arms control discussions, most of their arms control efforts during the rest of that decade focused on implementing the 1991 Strategic Arms Reduction Treaty (START) and negotiating deeper reductions in strategic nuclear weapons.

The lack of public attention did not, however, reflect a total absence of questions or concerns about nonstrategic nuclear weapons. In 1997, President Clinton and Russia's President Boris Yeltsin signed a framework agreement that stated they would address measures related to nonstrategic nuclear weapons in a potential START III Treaty. Further, during the 1990s, outside analysts, officials in the U.S. government, and many Members of Congress raised continuing questions about the safety and security of Russia's remaining nonstrategic nuclear weapons. Congress also sought a more detailed accounting of Russia's weapons in legislation passed in the late 1990s. Analysts have also questioned the role that these weapons might play in Russia's evolving national security strategy, the rationale for their continued deployment in the U.S. nuclear arsenal, and their relationship to U.S. nuclear nonproliferation policy. The terrorist attacks of September 11, 2001 also reminded people of the catastrophic consequences that might ensue if terrorists were to acquire and use nuclear weapons, with continuing attention focused on the potentially insecure stock of Russian nonstrategic nuclear weapons. Many analysts outside government have argued that the United States and Russia should pursue a formal arms control treaty, possibly including other nuclear weapons states, to reduce and eliminate these weapons.

The Bush Administration has not, however, adopted a policy of reducing or eliminating nonstrategic nuclear weapons. When it announced the results of its nuclear posture review in early 2002, it did not outline any changes to the U.S. deployment of nonstrategic nuclear weapons at bases in Europe; it stated that NATO would address the future of those weapons. It also did not discuss these weapons with Russia during arms control negotiations in 2002. Instead, the Strategic Offensive Reductions Treaty (Moscow Treaty) signed in May 2003 limits only the number of operationally deployed warheads on strategic nuclear weapons. Further, the Bush Administration had sought funding for a study to determine whether the United States could modify an existing nuclear weapon to improve its capability as a "robust nuclear earth penetrator" — a weapon that could attack and destroy hardened and deeply buried targets. The Bush Administration argued that a new earth penetrating nuclear weapon would enhance the U.S. nuclear deterrent and improve U.S. security by improving the U.S. ability to hold at risk key assets of emerging adversaries. However, in the face of strong congressional opposition, the Administration reportedly withdrew its request for funding during the FY2006 authorization and appropriations process.

Many analysts outside government, and some Members of Congress, have argued, however that the Bush Administration's policies not only ignore the potential risks from Russia's nonstrategic nuclear weapons, but will also "ignite a new arms race" by raising the perceived utility of nuclear weapons. This report will review the

debate over the implications of the Administration's policy in a later section. It is worth noting at this point, however, that the Bush Administration's policy represents a stark reversal from trends and debates during the late 1990s. At that time, debates in the nuclear weapons policy community focused on whether the United States should retain its relatively small arsenal of nonstrategic nuclear weapons (when compared with the size of the Russia arsenal) or offer to reduce those weapons as a part of an effort to reduce and secure the remaining Russian arsenal. The Bush Administration has quieted discussions about nonstrategic nuclear weapons arms control and has, instead, begun to consider how the United States can maintain or enhance its own stockpile of these weapons while discouraging the acquisition of nuclear weapons by other nations.

In the past few years, however, in response to the Administration's emphasis on the role that U.S. nuclear weapons can play in deterring or defeating nations armed with weapons of mass destruction, and in response to requests for funding for studies on new nuclear weapons, Congress had begun to review and debate the Administration's plans for U.S. nuclear weapons. These debates have not focused on the difference between strategic and nonstrategic nuclear weapons or on the particular concerns that have been raised about nonstrategic nuclear weapons in the past decade. Instead, they have explored, in greater detail, Administration requests for funding for research into new types of nuclear weapons. Nevertheless, as the United States studies possible changes to its nuclear force structure that might include the deployment of new nuclear weapons, nonstrategic nuclear weapons may again rise to a higher profile. Congress might then pursue a broader debate about nonstrategic nuclear weapons and consider further measures to either broaden or narrow the role of these weapons in U.S. national security policy. In addition, Congress has remained concerned about the potential risks associated with Russia's continuing deployment of nonstrategic nuclear weapons. The FY2006 Defense Authorization Act (P.L.109-163) contains two provisions that call for further study on these weapons. Section 1212 mandates that the Secretary of Defense submit a report that would determine whether increased transparency and further reductions in U.S. and Russian nonstrategic nuclear weapons are in the U.S. national security interest; Section 3115 calls on the Secretary of Energy to submit a report on what steps the United States might take to bring about progress in improving the accounting for and security of Russia's nonstrategic nuclear weapons.

This report provides basic information about U.S. and Russian nonstrategic nuclear weapons. It begins with a brief discussion of the differences between strategic and nonstrategic nuclear weapons. It then provides some historical background, describing the numbers and types of nonstrategic nuclear weapons deployed by both nations during the Cold War and in the past decade; the policies that guided the deployment and prospective use of these weapons; and the measures that the two sides have taken to reduce, eliminate, and, more recently, augment their forces. The report reviews the issues that have been raised with regards to U.S. and Russian nonstrategic nuclear weapons, essentially identifying the "problems" many associate with the continued deployment of these weapons. It concludes with a review of policy options, or "solutions" for the preceding problems, that might be explored by Congress, the United States, Russia, and other nations.

## The Distinction Between Strategic and Nonstrategic Nuclear Weapons

The distinction between strategic and nonstrategic (also known as tactical) nuclear weapons reflects the military definitions of, on the one hand, a strategic mission and, on the other hand, the tactical use of nuclear weapons. According to the Department of Defense Dictionary of Military Terms,<sup>1</sup> a strategic mission is:

Directed against one or more of a selected series of enemy targets with the purpose of progressive destruction and disintegration of the enemy's warmaking capacity and will to make war. Targets include key manufacturing systems, sources of raw material, critical material, stockpiles, power systems, transportation systems, communication facilities, and other such target systems. As opposed to tactical operations, strategic operations are designed to have a long-range rather than immediate effect on the enemy and its military forces.

In contrast, the tactical use of nuclear weapons is defined as "the use of nuclear weapons by land, sea, or air forces against opposing forces, supporting installations or facilities, in support of operations that contribute to the accomplishment of a military mission of limited scope, or in support of the military commander's scheme of maneuver, usually limited to the area of military operations."

**Definition by Observable Capabilities.** During the Cold War, it was relatively easy to distinguish between strategic and nonstrategic nuclear weapons because each type had different capabilities that were better suited to the different missions.

**Definition by Range of Delivery Vehicles.** The long-range missiles and heavy bombers deployed on U.S. territory and missiles deployed in ballistic missile submarines had the range and destructive power to attack and destroy military, industrial, and leadership targets central to the Soviet Union's ability to prosecute the war. At the same time, with their large warheads and relatively limited accuracies (at least during the earlier years of the Cold War), these weapons were not suited for attacks associated with tactical or battlefield operations. Nonstrategic nuclear weapons, in contrast, were not suited for strategic missions because they lacked the range to reach targets inside the Soviet Union (or, for Soviet weapons, targets inside the United States). But, because they were often small enough to be deployed with troops in the field or at forward bases, the United States and Soviet Union could have used them to attack targets in the theater of the conflict, or on the battlefield itself, to support more limited military missions.

Even during the Cold War, however, the United States and Russia deployed nuclear weapons that defied the standard understanding of the difference between strategic and nonstrategic nuclear weapons. For example, both nations considered weapons based on their own territories that could deliver warheads to the territory of the other nation to be "strategic" because they had the range needed to reach targets

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<sup>1</sup> This dictionary, and these definitions can be found on the DOD website at [<http://www.dtic.mil/doctrine/jel/doddict/index.html>].

inside the other nation's territory. But some early Soviet submarine-launched ballistic missiles had relatively short (i.e. 500 mile) ranges, and the submarines patrolled close to U.S. shores to ensure that the weapons could reach their strategic targets. Conversely, in the 1980s the United States considered sea-launched cruise missiles (SLCMs) deployed on submarines or surface ships to be nonstrategic nuclear weapons. But, if these vessels were deployed close to Soviet borders, these weapons could have destroyed many of the same targets as U.S. strategic nuclear weapons. Similarly, U.S. intermediate-range missiles that were deployed in Europe, which were considered nonstrategic by the United States, could reach central, strategic targets in the Soviet Union.

Furthermore, some weapons that had the range to reach "strategic" targets on the territory of the other nations could also deliver tactical nuclear weapons in support of battlefield or tactical operations. Soviet bombers could be equipped with nuclear-armed anti-ship missiles; U.S. bombers could also carry anti-ship weapons and nuclear mines. Hence, the range of the delivery vehicle does not always correlate with the types of targets or objectives associated with the warhead carried on that system. This relationship between range and mission has become even more clouded since the end of the Cold War because the United States and Russia have retired many of the shorter and medium-range delivery systems considered to be nonstrategic nuclear weapons. Further, both nations may develop the capability to use their longer-range "strategic" systems to deliver warheads to a full range of strategic and tactical targets, even if longstanding traditions and arms control definitions weigh against this change.

**Definition by Yield of Warheads.** During the Cold War, the longer-range strategic delivery vehicles also tended to carry warheads with greater yields, or destructive power, than nonstrategic nuclear weapons. Smaller warheads were better suited to nonstrategic weapons because they sought to achieve more limited, discrete objectives on the battlefield than did the larger, strategic nuclear weapons. But this distinction has also dissolved in more modern systems. Many U.S. and Russian heavy bombers can carry weapons of lower yields, and, as accuracies improved for bombs and missiles, warheads with lower yields could achieve the same expected level of destruction that had required larger warheads in early generations of strategic weapons systems.

**Definition by Exclusion.** The observable capabilities that allowed analysts to distinguish between strategic and nonstrategic nuclear weapons during the Cold War have not always been precise, and may not prove to be relevant or appropriate in the future. On the other hand, the "strategic" weapons identified by these capabilities — ICBMs, SLBMs, and heavy bombers — are the only systems covered by the limits in strategic offensive arms control agreements — the SALT agreements signed in the 1970s, the START agreements signed in the 1990s, and the Moscow Treaty in signed in 2002. Consequently, an "easy" dividing line is one that would consider all weapons *not* covered by strategic arms control treaties as nonstrategic nuclear weapons. This report takes this approach when reviewing the history of U.S. and Soviet/Russian nonstrategic nuclear weapons, and in some cases when discussing remaining stocks of nonstrategic nuclear weapons.



This definition will not, however, prove sufficient when discussing current and future issues associated with these weapons. Since the early 1990s, the United States and Russia have withdrawn from deployment most of their nonstrategic nuclear weapons and eliminated many of the shorter and medium-range launchers for these weapons (these changes are discussed in more detail below). Nevertheless, both nations maintain roles for these weapons in their national security strategies. Russia has enunciated a national security strategy that allows for the possible use of nuclear weapons in regional contingencies and conflicts near the periphery of Russia. The Bush Administration, has also stated that the United States will maintain those capabilities in its nuclear arsenal that it might need counter the capabilities of potential adversaries. The Administration does not, however, identify whether those capabilities will be resident on strategic or nonstrategic nuclear weapons. That distinction will reflect the nature of the target, not the yield or delivery vehicle of the attacking warhead.

## **U.S. and Soviet Nonstrategic Nuclear Weapons**

### **U.S. Nonstrategic Nuclear Weapons During the Cold War**

Throughout the Cold War, the United States deployed thousands of shorter-range nuclear weapons with U.S. forces based in Europe, Japan, and South Korea and on ships around the world. The United States maintained these deployments to *extend* deterrence and to defend its allies in Europe and Asia. Not only did the presence of these weapons (and the presence of U.S. forces, in general) increase the likelihood that the United States would come to the defense of its allies if they were attacked, the weapons also could have been used on the battlefield to slow or stop the advance of the adversaries' conventional forces. The weapons in Asia also contributed to U.S. efforts to defend its allies there from potential threats from China and North Korea.

**Strategy and Doctrine.** In most cases, these weapons were deployed to defend U.S. allies against aggression by the Soviet Union and its Warsaw Pact allies, but it did not rule out their possible use in contingencies with other adversaries. In Europe, these weapons were a part of NATO's strategy of "flexible response." Under this strategy, NATO did not insist that it would respond to any type of attack with nuclear weapons, but it maintained the capability to do so and to control escalation if nuclear weapons were used. This approach was intended to convince the Soviet Union and Warsaw Pact that any conflict, even one that began with conventional weapons, could result in nuclear retaliation.<sup>2</sup> As the Cold War drew to a close, NATO acknowledged that it would no longer maintain nuclear weapons to deter or defeat a conventional attack from the Soviet Union and Warsaw Pact because "the threat of a simultaneous, full-scale attack on all of NATO's European fronts has

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<sup>2</sup> "The United States retains substantial nuclear capabilities in Europe to counter Warsaw Pact conventional superiority and to serve as a link to U.S. strategic nuclear forces." *National Security Strategy of the United States*, White House, January 1988, p. 16.

effectively been removed.”<sup>3</sup> But NATO documents indicated that these weapons would still play an important political role in NATO’s strategy by ensuring “uncertainty in the mind of any potential aggressor about the nature of the Allies’ response to military aggression.”<sup>4</sup>

**Force Structure.** Throughout the Cold War, the United States often altered the size and structure of its nonstrategic nuclear forces in response to changing capabilities and changing threat assessments. These weapons were deployed at U.S. bases in Asia, and at bases on the territories of several of the NATO allies, contributing to NATO’s sense of shared responsibility for the weapons. The United States began to reduce these forces in the late 1970s, with the numbers of operational nonstrategic nuclear warheads declining from more than 7,000 in the mid-1970s to below 6,000 in the 1980s, to fewer than 1,000 by the middle of the 1990s.<sup>5</sup> These reductions occurred, for the most part, because U.S. and NATO officials believed they could maintain deterrence with fewer, but more modern, weapons. For example, when the NATO allies agreed in 1970 that the United States should deploy new intermediate range nuclear weapons in Europe, they decided to remove 1,000 older nuclear weapons from Europe. And in 1983, in the Montebello Decision, when the NATO defense ministers approved additional weapons modernization plans, they also called for a further reduction of 1,400 nonstrategic nuclear weapons.<sup>6</sup>

These modernization programs continued through the 1980s. In his 1988 Annual Report to Congress, Secretary of Defense Caspar Weinberger noted that the United States was completing the deployment of Pershing II intermediate-range ballistic missiles and ground-launched cruise missiles in Europe; modernizing two types of nuclear artillery shells; upgrading the Lance short-range ballistic missile; continuing production of the nuclear-armed version of the Tomahawk sea-launched cruise missile; and developing a new nuclear depth/strike bomb for U.S. naval forces.<sup>7</sup> However, by the end of that decade, as the Warsaw Pact dissolved, the United States had canceled or scaled back all planned modernization programs. In 1987, it also signed the Intermediate-Range Nuclear Forces (INF) Treaty, which eliminated all U.S. and Soviet ground-launched shorter and intermediate-range ballistic and cruise missiles.<sup>8</sup>

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<sup>3</sup> North Atlantic Treaty Organization, “The Alliance’s Strategic Concept,” NATO Office of Information and Press, Brussels, Belgium, 1991, para. 8.

<sup>4</sup> Ibid, para. 55.

<sup>5</sup> *Toward a Nuclear Peace: The Future of Nuclear Weapons in U.S. Foreign and Defense Policy*, Report of the CSIS Nuclear Strategy Study Group, Center for Strategic and International Studies, 1993. p. 27.

<sup>6</sup> The text of the Montebello decision can be found in Larson, Jeffrey A. and Kurt J. Klingenberger, editors. *Controlling Non-Strategic Nuclear Weapons. Obstacles and Opportunities*, United States Air Force, Institute for National Security Studies, July 2001. pp. 265-266.

<sup>7</sup> Secretary of Defense Caspar Weinberger, *Annual Report to the Congress, Fiscal Year 1988*, January 1987, pp. 217-218.

<sup>8</sup> For a description of the terms and implications of this Treaty see, CRS Report RL30033, (continued...)

## Soviet Nonstrategic Nuclear Weapons During the Cold War

**Strategy and Doctrine.** During the Cold War, the Soviet Union also considered nuclear weapons to be instrumental to its military strategy.<sup>9</sup> Although the Soviet Union had pledged that it would not be the first to use nuclear weapons, most Western observers doubted that it would actually observe this pledge in a conflict. Instead, analysts argue that the Soviet Union had integrated nuclear weapons into its warfighting plans to a much greater degree than the United States. Soviet analysts stressed that these weapons would be useful for both surprise attack and preemptive attack. According to one Russian analyst, the Soviet Union would have used nonstrategic nuclear weapons to conduct strategic operations in the theater of war and to reinforce conventional units in large scale land and sea operations.<sup>10</sup> This would have helped the Soviet Union achieve success in these theaters of war and would have diverted forces of the enemy from Soviet territory.

The Soviet Union reportedly began to reduce its emphasis on nuclear warfighting strategies in the mid-1980s, under Soviet President Mikhail Gorbachev. He reportedly believed that the use of nuclear weapons would be catastrophic. Nevertheless, they remained a key tool of deterring and fighting a large-scale conflict with the United States and NATO.

**Force Structure.** The Soviet Union produced and deployed a wide range of delivery vehicles for nonstrategic nuclear weapons. At different times during the period, it deployed “suitcase bombs,” nuclear mines, shells for artillery, short-, medium, and intermediate ballistic missiles, short-range air-delivered missiles, and gravity bombs. The Soviet Union deployed these weapons at nearly 600 bases, with some located in Warsaw Pact nations in Eastern Europe, some in the non-Russian republics on the western and southern perimeter of the nation and throughout Russia. Estimates vary, but many analysts believe that, in 1991, the Soviet Union had more than 20,000 of these weapons. The numbers may have been higher, in the range of 25,000 weapons in earlier years, before the collapse of the Warsaw Pact.<sup>11</sup>

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<sup>8</sup> (...continued)

*Arms Control and Disarmament Activities: A Catalog of Recent Events*, by Amy F. Woolf, coordinator.

<sup>9</sup> For a more detailed review of Soviet and Russian nuclear strategy see CRS Report 97-586, *Russia’s Nuclear Forces: Doctrine and Force Structure Issues*, by Amy F. Woolf and Kara Wilson (Out of print. For copies, contact Amy Woolf at 202-707-2379.)

<sup>10</sup> Ivan Safranchuk, “Tactical Nuclear Weapons in the Modern World: A Russian Perspective,” in Alexander, Brian and Alistair Millar, editors, *Tactical Nuclear Weapons* (Washington D.C.: Brassey’s Inc., 2003), p. 53.

<sup>11</sup> Joshua Handler, “The 1991-1992 PNIs and the Elimination, Storage and Security of Tactical Nuclear Weapons,” in Alexander, Brian and Alistair Millar, editors, *Tactical Nuclear Weapons* (Washington D.C.: Brassey’s Inc., 2003), p. 31.

## The 1991 Presidential Nuclear Initiatives

In September and October 1991, U.S. President George H.W. Bush and Soviet President Mikhail Gorbachev sharply altered their nations' deployments of nonstrategic nuclear weapons.<sup>12</sup> Each announced unilateral, but reciprocal initiatives that marked the end of many elements of their Cold War nuclear arsenals.

**U.S. Initiative.** On September 27, 1991, U.S. President George H.W. Bush announced that the United States would withdraw all land-based tactical nuclear weapons (those that could travel less than 300 miles) from overseas bases and all sea-based tactical nuclear weapons from U.S. surface ships, submarines, and naval aircraft.<sup>13</sup> Under these measures the United States began dismantling approximately 2,150 warheads from the land-based delivery systems, including 850 warheads for Lance missiles and 1,300 artillery shells. It also withdrew about 500 weapons normally deployed aboard surface ships and submarines, and planned to eliminate around 900 B-57 depth bombs,<sup>14</sup> which had been deployed on land and at sea, and the weapons for land-based naval aircraft.<sup>15</sup> Furthermore, in late 1991, NATO decided to reduce by about half the number of weapons for nuclear-capable aircraft based in Europe, which led to the withdrawal of an additional 700 U.S. air-delivered nuclear weapons.

The United States implemented these measures very quickly. Nonstrategic nuclear weapons were removed from bases in Korea by the end of 1991 and Europe by mid-1992. The Navy had withdrawn nuclear weapons from its surface ships, submarines, and forward bases by the mid-1992.<sup>16</sup> The warhead dismantlement process has moved more slowly, taking most of the 1990s to complete for some weapons, and with some work still to be done on others, but this is due to the limits on capacity at the Pantex Plant in Texas, where the work is done.

The first Bush Administration decided to withdraw these weapons for several reasons. First, the threat the weapons were to deter — Soviet and Warsaw Pact attacks in Europe — had diminished with the collapse of the Warsaw Pact in 1989. Further, the military utility of the land-based weapons had declined as the Soviet Union pulled its forces eastward, beyond the range of these weapons. The utility of the sea-based weapons had also declined as a result of changes in U.S. warfighting

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<sup>12</sup> The speeches outlining these initiatives can be found in Larson, Jeffrey A. and Kurt J. Klingenger, editors, *Controlling Non-Strategic Nuclear Weapons. Obstacles and Opportunities*, United States Air Force, Institute for National Security Studies, July 2001, pp 273-283.

<sup>13</sup> President Bush also announced that he would remove from alert all U.S. strategic bombers and 450 Minuteman II ICBMs that were to be eliminated under the START Treaty. He also cancelled several modernization programs for strategic and non-strategic nuclear weapons.

<sup>14</sup> Joshua Handler, in Alexander and Millar, *Tactical Nuclear Weapons*, pp 21-22.

<sup>15</sup> The United States maintained the capability to return sea-based nuclear weapons to aircraft carriers and submarines until this policy was changed through the Nuclear Posture Reviews of 1994 and 2001.

<sup>16</sup> Joshua Handler, in Alexander and Millar, *Tactical Nuclear Weapons*, p. 22.

concepts that accompanied the end of the Cold War. Moreover, the withdrawal of the sea-based weapons helped ease a source of tensions between the United States and some allies, such as New Zealand and Japan, who had been uncomfortable with the possible presence of nuclear weapons during port visits by U.S. naval forces.<sup>17</sup>

The President's announcement also responded to growing concerns among analysts about the safety and security of Soviet nonstrategic nuclear weapons. The Soviet Union had deployed thousands of these weapons at bases in remote areas of its territory and at bases outside Soviet territory in Eastern Europe. The demise of the Warsaw Pact, and political upheaval in Eastern Europe generated concerns about the safety of these weapons. The abortive coup in Moscow in August 1991 had also caused alarms about the strength of central control over nuclear weapons inside the Soviet Union. The U.S. initiative was not contingent on a Soviet response, and the Bush Administration did not consult with Soviet leadership prior to its public announcement, but many hoped that the U.S. initiative would provide President Gorbachev with the incentive to take similar steps to withdraw and eliminate many of his nation's nonstrategic nuclear weapons.

**Soviet and Russian Initiatives.** On October 5, 1991, Russia's President Gorbachev replied that he, too, would withdraw and eliminate nonstrategic nuclear weapons.<sup>18</sup> He stated that the Soviet Union would destroy all nuclear artillery ammunition and warheads for tactical missiles; remove warheads for nuclear anti-aircraft missiles and destroy some of them, destroy all nuclear land-mines; and remove all naval non-strategic weapons from submarines and surface ships and ground-based naval aviation, destroying some of them. Estimates of the numbers of nonstrategic nuclear weapons deployed by the Soviet Union varied, with a range as great as 15,000-21,700 nonstrategic nuclear weapons in the Soviet arsenal in 1991.<sup>19</sup> Consequently, analysts expected these measures to affect several thousand weapons.

Russia's President Boris Yeltsin pledged to continue implementing these measures after the Soviet Union collapsed at the end of 1991. He also stated that Russia would destroy many of the warheads removed from nonstrategic nuclear weapons.<sup>20</sup> These included all warheads from short-range missiles, artillery, and atomic demolition devices; one-third of the warheads from sea-based nonstrategic weapons; half the warheads from air-defense interceptors; and half the warheads from the Air Force's nonstrategic nuclear weapons.

Reports indicate that the Soviet Union had begun removing nonstrategic nuclear weapons from bases outside Soviet territory after the collapse of the Warsaw Pact, and they had probably all been removed from Eastern Europe and the Transcaucasus

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<sup>17</sup> See, for example, *Crisis in U.S.-New Zealand Relations*, CRS Report 85-92, by Robert G. Sutter, (Out of print. For copies, contact Amy Woolf at 202-707-2379.)

<sup>18</sup> President Gorbachev also addressed strategic nuclear weapons in his initiative, announcing that he would remove bombers and more than 500 ballistic missiles from alert and cancelling many modernization programs.

<sup>19</sup> Joshua Handler, in Alexander and Millar, *Tactical Nuclear Weapons*, p. 31.

<sup>20</sup> For the text of President Yeltsin's statement, see Larsen and Klingenberg, pp. 284-289.

prior to the 1991 announcements. Nevertheless, President Gorbachev's pledge to withdraw and eliminate many of these weapons spurred their removal from other former Soviet states after the collapse of the Soviet Union. Reports indicate that they had all been removed from the Baltic States and Central Asian republics by the end of 1991, and from Ukraine and Belarus by mid-late spring 1992.<sup>21</sup>

The status of nonstrategic nuclear weapons deployed on Russian territory is far less certain. According to some estimates, the naval systems were removed from deployment by the end of 1993, but the Army and Air force systems remained in the field until 1996 and 1997.<sup>22</sup> Furthermore, Russia has been far slower to eliminate the warheads from these systems than has the United States, with many warheads still awaiting elimination at the end of the 1990s. Some analysts and experts in the United States have expressed concerns about the slow pace of eliminations in Russia. They note that the continuing existence of these warheads, along with the increasing reliance on nuclear weapons in Russia's national security strategy, indicate that Russia may reverse its pledges and re-introduce nonstrategic nuclear weapons into its deployed forces. Others, however, note that financial constraints could have slowed the elimination of these warheads, or that Russia decided to coordinate the elimination effort with the previously-scheduled retirement of older weapons.<sup>23</sup>

## U.S. Nonstrategic Nuclear Weapons after the Cold War

**Strategy and Doctrine.** Nonstrategic nuclear weapons have continued to play a role in U.S. and NATO policy. For the United States, the emphasis has shifted from a strategy that emphasized the deterrence of an attack from the Soviet Union and its allies to one that has placed a growing emphasis on the role that nuclear weapons might play in deterring or responding to regional contingencies that involved nations other than Russia. For example, former Secretary of Defense Perry stated that, "maintaining U.S. nuclear commitments with NATO, and *retaining the ability to deploy nuclear capabilities to meet various regional contingencies*, continues to be an important means for deterring aggression, protecting and promoting U.S. interests, reassuring allies and friends, and preventing proliferation (emphasis added).<sup>24</sup> Specifically, the United States maintains the option to use nuclear weapons in response to attacks with conventional, chemical, or biological weapons. For example, Assistant Secretary of Defense Edward Warner testified that "the U.S. capability to deliver an overwhelming, rapid, and devastating military response with the full range of military capabilities will remain the cornerstone of our strategy for deterring rogue nation ballistic missile and WMD proliferation threats. The very existence of U.S. strategic and theater nuclear forces, backed by highly

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<sup>21</sup> Joshua Handler, in Alexander and Millar, *Tactical Nuclear Weapons*, p. 22.

<sup>22</sup> Joshua Handler, "The September 1991 PNIs and the Elimination, Storage and Security Aspects of TNWs," Presentation for seminar at the United Nations, New York. September 24, 2001.

<sup>23</sup> Ivan Safranchik, "Tactical Nuclear Weapons in the Modern World: A Russian Perspective," in Alexander and Millar, *Tactical Nuclear Weapons*, p. 62.

<sup>24</sup> Secretary of Defense William J. Perry, *Annual Report to the President and the Congress*, February 1995, p. 84.

capable conventional forces, should certainly give pause to any rogue leader contemplating the use of WMD against the United States, its overseas deployed forces, or its allies.”<sup>25</sup> These statements do not indicate whether nonstrategic nuclear weapons would be used to achieve battlefield or tactical objectives, or whether they would contribute to strategic missions, but it remained evident, throughout the 1990s, that the United States continued to view these weapons as a part of its national security strategy.

The Bush Administration also emphasized the possible use of nuclear weapons in regional contingencies in its 2001 nuclear posture review. Further, the Administration appeared to shift towards a somewhat more explicit approach when acknowledging that the United States might use nuclear weapons in response to attacks by nations armed with chemical, biological, and conventional weapons, stating that the United States would develop and deploy those nuclear capabilities that it would need to defeat the capabilities of *any* potential adversary whether or not it possessed nuclear weapons. This does not, by itself, indicate that the United States would plan to use nonstrategic nuclear weapons. However, many analysts concluded from these and other comments by Administration officials that the Bush Administration was planning for the tactical, first use of nuclear weapons. The Bush Administration has never confirmed this view, and, instead, has indicated that it would not use nuclear weapons in anything other than the most grave circumstances.

For NATO, nonstrategic nuclear weapons have played a reduced, but continuing, role in security policy. They have been seen not only as a deterrent to a wide range of potential aggressors, but also as an important element in NATO’s cohesion as an alliance. In the Press Communique released after their November 1995 meeting, the members of NATO’s Defense Planning Committee and Nuclear Planning Group stated that “Alliance Solidarity, common commitment, and strategic unity are demonstrated through the current basing of deployable sub-strategic [nuclear] forces in Europe.”<sup>26</sup> NATO has also reaffirmed the importance of nuclear weapons for deterrence. The “New Strategic Concept” signed in April 1999 states that “to protect peace and to prevent war or any kind of coercion, the Alliance will maintain for the foreseeable future an appropriate mix of nuclear and conventional forces. Nuclear weapons make a unique contribution in rendering the risks of aggression against the Alliance incalculable and unacceptable.”<sup>27</sup> NATO had also emphasized the importance of nuclear weapons in its strategy in 1997, in the *Founding Act on Mutual Relations, Cooperation, and Security Between the Russian Federation and the North Atlantic Treaty Organization*. Although the NATO members assured Russia that it had “no intention, no plan, and no reason to deploy nuclear weapons on the territory of new members,” it also stated that it had no need

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<sup>25</sup> Statement of the Honorable Edward L. Warner, III, Assistant Secretary of Defense for Strategy and Threat Reduction, before the Senate Armed Services Subcommittee on Strategic Forces, April 14, 1999.

<sup>26</sup> NATO Press Communique M-DPC/NPG-2(95)117, November 29, 1995, para. 21.

<sup>27</sup> *The Alliance’s Strategic Concept*, approved by the Heads of State and Government participating in the meeting of the North Atlantic Council in Washington D.C., April 23-24, 1999.

“to change any aspect of NATO’s nuclear policy — and do not foresee any future need to do so (emphasis added).”<sup>28</sup>

**Force Structure.** Through the late 1990s and into the Bush Administration, the United States has maintained approximately 1,100 nonstrategic nuclear weapons in its active stockpile. Unclassified reports indicate that, of this number, around 500 were air-delivered bombs deployed at bases in Europe. The remainder, including some additional air-delivered bombs and around 320 nuclear-armed sea-launched cruise missiles, are held in storage areas in the United States.<sup>29</sup> After the Clinton Administration’s 1994 Nuclear Posture Review, the United States eliminated its ability to return nuclear weapons to U.S. surface ships (it had retained this ability after removing the weapons under the 1991 PNI). It retained, however, its ability to restore cruise missiles to attack submarines, and it did not recommend any changes in the number of air-delivered weapons deployed in Europe. The United States has consolidated its weapons storage sites for nonstrategic nuclear weapons. It reportedly reduced the number of these facilities “by over 75%” between 1988 and 1994. It eliminated 2 of its 4 storage sites for sea-launched cruise missiles, retaining only one facility on each coast of the United States. It also reduced the number of bases in Europe that store nuclear weapons from over 125 bases in the mid-1980s to 10 bases, in seven countries, by 2000.<sup>30</sup> Some reports indicate that this number had declined further, to six bases in five countries, by the end of 2004.<sup>31</sup>

The Bush Administration did not recommend any changes for U.S. nonstrategic nuclear weapons after completing its Nuclear Posture Review in 2001. Reports indicate that it has decided to retain the capability to restore cruise missiles to attack submarines because of their ability to deploy, in secret, anywhere on the globe in time of crisis.<sup>32</sup> The NPR also did not recommend any changes to the deployment of nonstrategic nuclear weapons in Europe, leaving decisions about their status to the members of the NATO alliance. The alliance has reviewed these deployments and reaffirmed that the weapons remain an important indicator of alliance unity, with the sharing of information about the weapons and sharing of responsibility for their basing serving as an important bond among the members of the alliance.

After completing the NPR, the Bush Administration indicated that the United States will explore the development of new types of nuclear warheads. It has commissioned a study on the Robust Nuclear Earth Penetrator, which will be a

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<sup>28</sup> “Founding Act on Mutual Relations, Cooperation, and Security Between the Russian Federation and the North Atlantic Treaty Organization,” signed at Paris, May 27, 1997.

<sup>29</sup> “NRDC Nuclear Notebook: U.S. Nuclear Forces, 2004,” *Bulletin of the Atomic Scientists*, May/June 2004. See, also, U.S. Nuclear Weapons in Europe, 1954-2004, by Robert S. Norris and Hans M. Kristensen. *Bulletin of the Atomic Scientists*. November/December 2004.

<sup>30</sup> Joshua Handler, in Alexander and Millar, *Tactical Nuclear Weapons*, pp. 23.-25

<sup>31</sup> Norris and Kristensen, “U.S. Nuclear Weapons in Europe, 1954-2004,” *Bulletin of the Atomic Scientists*, November/December 2004.

<sup>32</sup> *Ibid.*



modification of an existing type of nuclear weapon.<sup>33</sup> This program is designed to improve the U.S. capability to attack hardened and deeply buried targets. The Administration has argued that the United States must improve its capability to attack these types of targets because many potential adversaries have a significant number of these facilities, which they could use to protect valued assets such as weapons stocks and command facilities. The Administration has not identified these weapons as either “strategic” or “nonstrategic;” such a designation would likely depend on the intended target for the weapon in the event of a conflict. The Administration has also funded research into Advanced Concepts for nuclear weapons. This program has not yet pursued any particular research or identified any new types of weapons for further study, but many of the Administration’s critics believe it might be used to develop new types of “low yield” nuclear weapons.

The Administration and others who support research into a new earth-penetrator weapon argue that, by burrowing underground before exploding, these weapons could not only achieve a higher probability of destroying fortified targets, but might also do so with lower collateral damage by exploding deeply underground. According to the Administration, these features would increase their credibility as a deterrent weapon. Some have also argued that new types of nuclear weapons, such as highly accurate, low-yield weapons, could be used to attack and destroy stocks of chemical or biological weapons in their bunkers, again, with lower collateral damage than the larger, existing types of nuclear weapons. These programs’ critics argue that these weapons, with their reduced collateral damage, might be more “useable” than existing nuclear weapons, and, therefore, increase the likelihood that the United States would resort to nuclear weapons during a conflict. They note that, even with their earth-penetrating capabilities, these weapons would produce horrific damage and destruction. Further, they argue that any U.S. attempt to make nuclear weapons appear more “useable” or to have greater military utility, is likely to undermine U.S. efforts to convince other nations not to acquire their own nuclear weapons.

The targets for these new types of weapons could be “strategic” in nature, supporting the military or political infrastructure needed to pursue a conflict, or they could be more “tactical” in nature, supporting an adversary’s troops or battlefield formations. Therefore, the question of whether these weapons would be strategic or nonstrategic would depend on future war plans and targeting options. Yet with the sharp decline in the numbers and types of delivery vehicles for nonstrategic warheads, these weapons might be delivered by strategic delivery vehicles, such as ballistic missiles or bombers, regardless of their targeting objective. Hence, the U.S. plans for the development of new types of nuclear weapons highlight the complexities discussed above in defining and identifying nonstrategic nuclear weapons because, in future scenarios, it may be difficult to tell what a weapon is intended to attack by the range of its delivery vehicle or the yield of its warhead.

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<sup>33</sup> Congress denied funding for this study in the FY2005 Omnibus Appropriations Act (P.L. 108-447).

## Russian Nonstrategic Nuclear Weapons after the Cold War

**Strategy and Doctrine.** Russia has altered and adjusted the Soviet nuclear strategy to meet its new circumstances in a post-Cold War world. It explicitly rejected the Soviet Union's no-first use pledge in 1993, indicating that it viewed nuclear weapons as a central feature in its military and security strategies. However, Russia did not maintain the Soviet Union's view of the need for nuclear weapons to conduct surprise attacks or preemptive attacks. Instead, it seems to view these weapons as more defensive in nature, as a deterrent to conventional or nuclear attack and as a means to retaliate and defend itself if an attack were to occur.

Russia revised its national security and military strategy several times during the 1990s, with each successive version appearing to place a greater reliance on nuclear weapons.<sup>34</sup> For example, the military doctrine issued in 1997 allowed for the use of nuclear weapons "in case of a threat to the existence of the Russian Federation." The doctrine published in 2000 expanded the circumstances when Russia might use nuclear weapons to include attacks using weapons of mass destruction against Russia or its allies "as well as in response to large-scale aggression utilizing conventional weapons in situations critical to the national security of the Russian Federation."<sup>35</sup>

Analysts have identified several factors that contributed to Russia's increasing dependence on nuclear weapons. First, with the demise of the Soviet Union and the economic upheavals of the 1990s, Russia no longer had the means to support a large and effective conventional army. The conflict in Chechnya highlighted for many just how weak Russia's conventional military forces had become. Russian analysts also saw emerging threats in other former Soviet states along Russia's periphery. Many analysts believed that by threatening, even implicitly, that it might resort to nuclear weapons, Russia hoped it could enhance its ability to deter similar regional conflicts. Russia's sense of vulnerability, and its view that the threats to its security were increasing, also stemmed from the debates over NATO enlargement in the mid-1990s. Russia feared the growing alliance would create a new challenge to Russia's security, particularly if NATO moved nuclear weapons closer to Russia's borders. These concerns contributed to the statement that Russia might use nuclear weapons if its national survival were threatened. Russian officials repeated many of their concerns about NATO enlargement and new nuclear threats during the latest round of expansion in 2003 and 2004.

Finally, for many in Russia, NATO's air campaign in Kosovo in 1999 underlined Russia's growing weakness and NATO's increasing willingness to threaten Russian interests. Its National Security Concept published in 2000 noted that the level and scope of the military threat to Russia was growing. It cited, specifically, as a fundamental threat to its security, "the desire of some states and international associations to diminish the role of existing mechanisms for ensuring

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<sup>34</sup> According to Alexander Pikayev, a Russian defense analyst, scenarios for the possible use of nuclear weapons broadened since 1993 and 1997. See David Hoffman, "New Russian Security Plan Criticizes West, Doctrine Broadens Nuclear Use Policy," *Washington Post*, January 15, 2000, p. 1.

<sup>35</sup> "Russia's Military Doctrine," Reprinted in *Arms Control Today*, May 2000.

international security.” There are also threats in the border sphere. “A vital task of the Russian Federation is to exercise deterrence to prevent aggression on any scale and nuclear or otherwise, against Russia and its allies.” Consequently, Russia concluded that it “should possess nuclear forces that are capable of guaranteeing the infliction of the desired extent of damage against any aggressor state or coalition of states in any conditions and circumstances.”<sup>36</sup>

The debate over the role of nuclear weapons in Russia’s national security strategy considered both strategic and nonstrategic nuclear weapons. With concerns focused on threats emerging around the borders of the former Soviet Union, analysts specifically considered whether nonstrategic nuclear weapons could substitute for conventional weaknesses in regional conflicts. The government appeared to resolve this debate, in favor of the modernization and expansion of nonstrategic nuclear weapons in 1999, shortly after the conflict in Kosovo. During a meeting of the Kremlin Security Council, Russia’s President Yeltsin and his security chiefs reportedly agreed “that Moscow should develop and deploy tactical, as well as, strategic nuclear weapons.”<sup>37</sup> Vladimir Putin, who was then Chairman of the Security Council, stated that President Yeltsin had endorsed “a blueprint for the development and use of nonstrategic nuclear weapons.”<sup>38</sup>

Many analysts in the United States interpreted this development, along with questions about Russia’s implementation of its obligations under the 1991 PNI, to mean that Russia was “walking back” from its obligation to withdraw and eliminate nonstrategic nuclear weapons. Others drew a different conclusion. One Russian analyst has speculated that the documents approved in 1999 focused on the development of operations plans that would allow Russia to conduct “limited nuclear war with strategic means in order to deter the enemy, requiring the infliction of pre-planned, but limited damage.”<sup>39</sup> Specifically, he argued that Russia planned to seek a new generation of nonstrategic, or low yield, warheads that could be to be delivered by strategic launchers. Others believe Russia has also pursued the modernization of existing nonstrategic nuclear weapons and development of new nuclear warheads for shorter-range nuclear missiles.

**Force Structure.** It is extremely difficult to estimate the number of nonstrategic nuclear weapons remaining in the Russia arsenal. This uncertainty stems from several factors: uncertainty about the number of nonstrategic nuclear weapons that the Soviet Union had stored and deployed in 1991, when President Gorbachev announced his PNI; uncertainty about the pace of warhead elimination in

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<sup>36</sup> “2000 Russian National Security Concept,” *Nezavisimoye Voennaye Obozreniye*, January 14, 2000.

<sup>37</sup> Martin Nesirky, “Focus: Nuclear-power Russia Wants Tactical Weapons,” *Reuters*, April 29, 1999.

<sup>38</sup> David Hoffman, “Kremlin to Bolster Nuclear Stockpile, Government Fears Short-Range Missiles May Be Inadequate,” *Washington Post*, April 30, 1999, p. 19.

<sup>39</sup> Ivan Safranchik, “Tactical Nuclear Weapons in the Modern World: A Russian Perspective,” in Alexander and Millar, *Tactical Nuclear Weapons*, p. 54.

Russia; and uncertainty about the whether all warheads removed from deployment are still scheduled for elimination.

Analysts estimate that the Soviet Union may have deployed 15,000-25,000 nonstrategic nuclear weapons, or more, in the late 1980s and early 1990s. During the 1990s, Russian officials stated publicly that they had completed the weapons withdrawals mandated by the PNIs and had proceeded to eliminate warheads at a rate of 2,000 per year.<sup>40</sup> However, many experts doubt these statements, noting that Russia probably lacked the financial and technical means to proceed this quickly. In addition Russian officials have offered a moving deadline for this process in their public statements. For example, at the Nuclear Nonproliferation Treaty review conference in 2000, Russian Foreign Minister Ivanov stated that Russia was about to finish implementing its PNIs. But, at a follow-up meeting two years later, Russian officials stated that the elimination process was continuing, and, with adequate funding, could be completed by the end of 2004.<sup>41</sup> Furthermore, in late 2003, General Yuri Baluyevsky, who was then the first deputy chief of staff of the Russian General Staff stated that Russia would not destroy all of its tactical nuclear weapons, that it would, instead, “hold on to its stockpiles” in response to U.S. plans to develop new types of nuclear warheads.<sup>42</sup> Many analysts and U.S. officials interpreted this statement as a sharp reversal of Russia’s commitments under the 1991 PNIs.

With consideration for these uncertainties, analysts have estimated that Russia may still have between 3,000 and 8,000 warheads for nonstrategic nuclear weapons, with the lower number reflecting the number of deployed weapons and the higher number including those weapons that remain in central storage. While some estimate that only air-delivered weapons remain operational, the total amount may be split between warheads for tactical aviation, naval nuclear weapons, and air defense missiles, with some ground forces still in the mix.<sup>43</sup> Russia had also reportedly reduced the number of military bases that could deploy nonstrategic nuclear weapons by over 250 and had consolidated its storage areas for these weapons, eliminating about two-thirds of the 500-600 facilities it had operated at the beginning of the 1990s.<sup>44</sup>

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<sup>40</sup> Lewis Dunn, “Non-strategic Nuclear Weapons Control: What is the Problem?,” in Larsen, Jeffrey A. and Kurt J. Klingenger, editors, *Controlling Non-Strategic Nuclear Weapons: Obstacles and Opportunities*, United States Air Force, Institute for National Security Studies, July 2001, p. 17.

<sup>41</sup> Joshua Handler, in Alexander and Millar, *Tactical Nuclear Weapons*, p. 29.

<sup>42</sup> Vladimir Isachenkov, “U.S. Nuke Development Concerns Russia,” *Interfax*, November 26, 2003.

<sup>43</sup> A table summarizing three different estimates can be found in Andrea Gabbitas, “Non-strategic Nuclear Weapons: Problems of Definition,” in Larsen, Jeffrey A. and Kurt J. Klingenger, editors, *Controlling Non-Strategic Nuclear Weapons: Obstacles and Opportunities*, United States Air Force, Institute for National Security Studies, July 2001, p. 25. See also Nikolai Sokov, “*The Tactical Nuclear Weapons Controversy*,” *Jane’s Defence Weekly*, January 2001, pp. 16-17.

<sup>44</sup> Joshua Handler, in Alexander and Millar, *Tactical Nuclear Weapons*, p. 30.

## Changing the Focus of the Debate

The preceding sections of this report focus exclusively on U.S. and Soviet/Russian nonstrategic nuclear weapons. These weapons were an integral part of the Cold War stand-off between the two nations. The strategy and doctrine that would have guided their use and the numbers of deployed weapons both figured into calculations about the possibility that a conflict between the two nations might escalate to a nuclear exchange. Other nations — including France, Great Britain and China — also had nuclear weapons, but these did not affect the central conflict of the Cold War in the same way as U.S. and Soviet forces.

The end of the Cold War, however, and the changing international security environment during the 1990s, renders incomplete any discussion of nonstrategic nuclear weapons that is limited to U.S. and Russian forces. Because both these nations maintain weapons and plans for their use, the relationship between the two nations could still affect the debate about these weapons. In addition, Russian officials have turned to these weapons as a part of their response to concerns about a range of U.S. and NATO policies. Nevertheless, both these nations have looked beyond their mutual relationship when considering possible threats and responses that might include the use of nonstrategic nuclear weapons. Both nations have highlighted the threat of the possible use of nuclear, chemical or biological weapons by other potential adversaries or non-state actors. Both have indicated that they might use nuclear weapons to deter or respond to threats from other nations.

In addition, many analysts believe that a debate about nonstrategic nuclear weapons can no longer focus exclusively on the U.S. and Russian arsenals. Even though tensions have eased in recent months, with their nuclear tests in 1998 and continued animosity towards each other, India and Pakistan have joined the list of nations that may potentially resort to nuclear weapons in the event of a conflict. If measured by the range of delivery vehicles and the yield of the warheads, these nations' weapons could be considered to be nonstrategic. But each nation could plan to use these weapons in either strategic or nonstrategic roles. Both nations continue to review and revise their nuclear strategies, leaving many questions about the potential role for nuclear weapons in future conflicts. China also has nuclear weapons with ranges and missions that could be considered nonstrategic. Many analysts have expressed concerns about the potential for the use of nuclear weapons in a conflict over Taiwan or other areas of China's interests. This report does not review the nuclear weapons programs in these nations.<sup>45</sup> However, when reviewing the issues raised by, problems attributed to, and solutions proposed for nonstrategic nuclear weapons, the report acknowledges the role played by the weapons of these other nations.

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<sup>45</sup> For a more detailed discussion of Indian, Pakistani, and Chinese nuclear weapons, see Alexander, Brian and Alistair Millar, editors, *Tactical Nuclear Weapons*, op cit.

## Issues for Congress

Although nonstrategic nuclear weapons have not held a high profile in debates over national security or arms control debates, Congress may still address issues raised by these weapons in its discussions of U.S. nuclear weapons policy and U.S. nonproliferation policy. Analysts have identified several issues, or problems, associated with the continuing deployment of U.S. and Russian nonstrategic nuclear weapons. They have also identified potential policy options, or solutions, that might resolve these problems. However, they do not all agree on the importance of the problems or the need for the solutions. This section identifies these problems and potential solutions and reviews the contrasting opinions about them.

### Issues

#### **Safety and Security of Russian Nonstrategic Nuclear Weapons.**

Most analysts agree that the greatest risks from Russia's continued deployment of nonstrategic nuclear weapons stem from potential problems with their safety and security in storage areas and a possible lack of central control over their use when deployed in the field. These weapons were deployed, and many remain in storage, at remote bases close to potential battlefields and far from the central command authority in Moscow. Further, the economic chaos in Russia during the 1990s raised questions about the stability and reliability of the troops charged with monitoring and securing these weapons. Hence, these issues raise concerns about the possibility that the weapons might be lost, stolen, or sold to other nations or groups seeking nuclear weapons.<sup>46</sup> Russian officials acknowledged concerns about the safety and security of these weapons in the early 1990s, and such concerns may have contributed to acceptance of the PNIs in 1991. But Russian officials deny that they have lost control over any of their nonstrategic nuclear weapons and they contend that the problems have been resolved as the weapons have been withdrawn to central storage areas.<sup>47</sup> Further, there is not public evidence from western sources about any episodes of lost, sold, or stolen Russian nuclear weapons.

#### **The Role of Nonstrategic Nuclear Weapons in Russia's National Security Policy.**

Many analysts also argue that Russia's nonstrategic nuclear weapons pose a risk to the United States, its allies, and others because Russia has altered its national security concept and military strategies, increasing its reliance on nuclear weapons. Some fear that Russia might resort to the early use of nuclear weapons in a conflict along its periphery, which could lead to a wider conflict and the possible involvement of troops from NATO or other neighboring countries, possibly drawing in new NATO members. Some also believe that Russia could threaten NATO with its nonstrategic nuclear weapons because Russia sees NATO as

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<sup>46</sup> "Because of their size and forward basing, they are especially vulnerable to theft and unauthorized use." See William C. Potter and Nikolai Sokov, "Nuclear Weapons that People Forget," *International Herald Tribune*, May 31, 2000.

<sup>47</sup> Russia's defense minister, Sergei Ivanov, has said that Russia's nuclear arsenal is safe and militants could never steal an atomic bomb from the country. He further noted that it is a myth that "Russian nuclear weapons are guarded badly and weakly." See "Russia Says No Militant Threat to Nuclear Arsenal," *Reuters*, August 3, 2004.

a threat to its security. Russian analysts and officials have argued that NATO enlargement, with the possible deployment of nuclear weapons on the territories of new NATO members close to Russia's borders, demonstrated how much NATO could threaten Russia.

Others argue, however, that regardless of Russia's rhetoric, "Russia's theater nuclear weapons are not ... destabilizing." Even if modernized, these weapons will not "give Moscow the capability to alter the strategic landscape."<sup>48</sup> Further, many doubt that Russian weapons, even with its new military strategy, pose a threat to NATO or U.S. allies. They argue that Russia would only use these weapons in response to a weak performance by its conventional forces in an ongoing conflict. Since it would be extremely unlikely for NATO to be involved in a conventional conflict with Russia, it would be extremely unlikely for Russian weapons to find targets in NATO nations.

**The Role of Nonstrategic Nuclear Weapons in U.S. National Security Policy.** The Bush Administration has claimed, as a result of its 2001 Nuclear Posture Review, the United States has reduced its reliance on nuclear weapons by increasing the role of missile defenses and precision conventional weapons in the U.S. deterrent posture. However, the Administration also noted, as a result of the Nuclear Posture Review, that the United States would no longer base the size and structure of its nuclear forces only on "the Russian threat." Instead, the United States would acquire and maintain those capabilities that it needed to deter and defend against the capabilities of any nation with the potential to threaten the United States, particularly if the potential adversary possesses weapons of mass destruction. It noted that these new, threatening capabilities could include hardened and deeply buried targets and, possibly, bunkers holding chemical or biological weapons. It indicated that the United States would seek to develop the capabilities to destroy these types of facilities.

The Administration has argued that its new policy is designed to enhance deterrence, by giving the United States more credible options in the event of a conflict with a nation armed with chemical, biological, or nuclear weapons. This, however presumes that the U.S. military could identify a credible scenario that included the option of using nuclear weapons. This may not be possible in battlefield contingencies, when U.S. forces would be vulnerable to fallout and other nuclear effects. Further, the use of nuclear weapons to destroy underground bunkers housing chemical or biological weapons presumes that the United States would have the exquisite intelligence needed to locate the bunkers with the agents. Anything less than a direct, precise attack could disperse more agent than it destroyed. Furthermore, such bunkers could be built within an extensive network of tunnels, using blast doors, reinforced concrete, and other shock absorbing techniques, which would further interfere with U.S. efforts to destroy them. In addition, the Administration's critics argue that, by tailoring its nuclear weapons to achieve

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<sup>48</sup> Robert Joseph, "Nuclear Weapons and Regional Deterrence," in Larson, Jeffrey A. and Kurt J. Klingenberg, editors, *Controlling Non-Strategic Nuclear Weapons: Obstacles and Opportunities*, United States Air Force, Institute for National Security Studies, July 2001. pp. 90-92.

specific battlefield objectives, the United States would actually increase the likelihood of nuclear use, rather than enhance nuclear deterrence. Further, they note that the United States does not need new nuclear weapons to achieve its battlefield objectives. It demonstrated in the recent war with Iraq that its conventional forces were more than capable of defeating an enemy and overthrowing a regime, even one with many deeply buried targets, with relative ease.<sup>49</sup> Therefore, the demonstrated, overwhelming superiority of U.S. conventional forces, rather than the hypothetical threat of nuclear use, would serve as a more potent deterrent in future conflicts.

**The Role of Nonstrategic Nuclear Weapons in NATO Policy and Alliance Strategy.** Many analysts have questioned whether the United States needs to continue to deploy nuclear weapons in Europe, more than ten years after the collapse of the Warsaw Pact and demise of the Soviet Union. NATO policy still views these weapons as a deterrent to any potential adversary, and they also serve as a link among the NATO nations, with bases in several nations and shared responsibility for nuclear policy planning and decision-making. But, if the United States develops new nuclear warheads that can fulfill nonstrategic missions with delivery from a strategic platforms (such as a heavy bomber), the need for forward basing in Europe diminishes. Hence, some believe that the blurring of the distinction between nonstrategic and strategic delivery vehicles, along with the increasing concerns about threats outside of Europe, have reduced the utility of forward-deployed nuclear weapons.

Some also question whether the United States and NATO might benefit from the removal of these weapons. Not only would this address the Air Force's operational and security costs associated with their deployment, it also could serve as a signal to Russia of NATO's intentions to address Russia's perception of the threat from NATO. This, in turn, might encourage Russia to accept negotiated limits or transparency measures on its nonstrategic nuclear weapons. Some also believe that a NATO "step away" from these weapons would encourage Russia to reduce its reliance on nonstrategic nuclear weapons.

**The Relationship Between Nonstrategic Nuclear Weapons and U.S. Nonproliferation Policy.** The Bush Administration has stated that the new U.S. nuclear posture, along with the research into the development of new types of nuclear warheads, contributes to U.S. efforts to stem the proliferation of nuclear, chemical, and biological weapons. It argues that, by creating a more credible threat against the capabilities of nations that seek these weapons, the U.S. policy deters their acquisition or deployment. It also reinforces the value of the U.S. extended deterrent to allies in Europe and Japan, thus discouraging them from acquiring their own nuclear weapons.<sup>50</sup>

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<sup>49</sup> William Arkin, "New Nukes? No Way," *Los Angeles Times*, August 17, 2003.

<sup>50</sup> *An Assessment of the Impact of Repeal of the Prohibition on Low Yield Warhead Development on the Ability of the United States to Achieve its Nonproliferation Objectives*, jointly submitted to the Congress by the Secretary of State, Secretary of Defense, and Secretary of Energy, March 2004, p. 4.



Critics of the Administration's policy question whether the United States needs new nuclear weapons to deter the acquisition or use of WMD by other nations; as was noted above, they claim that U.S. conventional weapons can achieve this objective. Further, many analysts claim that the U.S. policy will actually spur proliferation, encouraging other countries to acquire their own WMD. Specifically, they note that U.S. plans and programs reinforce the view that nuclear weapons have military utility. If the world's only conventional superpower needs more nuclear weapons to maintain its security, then other nations could also argue that nuclear weapons would serve their security interests. Consequently, according to the Administration's critics, the United States will ignite a new arms race if it pursues new types of nuclear weapons to achieve newly defined battlefield objectives.<sup>51</sup> The Administration has countered this argument by noting that few nations acquire nuclear weapons in response to U.S. nuclear programs. They do so either to address their own regional security challenges, or to counter U.S. conventional superiority.<sup>52</sup>

## Policy Options

**Status Quo.** The Bush Administration, and some analysts outside government, argue that the United States does not have to adopt any new or different policies to address the issues raised above. They argue that the 2001 Nuclear Posture Review *strengthened* the U.S. nuclear deterrent by adjusting U.S. strategy and doctrine to address emerging, rather than Cold War, threats. They do not believe that these policy changes undermine U.S. nonproliferation policy or that they make the use of nuclear weapons more likely in future conflicts.

The Bush Administration also has not adopted any new policies to address the potential risks created by Russia's continued deployment of nonstrategic nuclear weapons. It did not address these weapons in the negotiations on the Strategic Offensive Reductions Treaty, although Administration officials did pledge to raise concerns about these weapons in discussions with their Russian counterparts. However, the Administration appears to believe that any concerns about the safety and security of these weapons can be addressed through the ongoing Cooperative Threat Reduction Program. They argue, however, that Russian nonstrategic nuclear weapons pose no military threat to stability or security for the United States or its allies, and therefore, require no unilateral or cooperative responses from the United States.<sup>53</sup> Further, some argue that any reciprocal or cooperative effort to address

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<sup>51</sup> "The long term consequences of developing new nuclear weapons might well be to push Iran, North Korea, and other states to work harder and faster in developing and manufacturing their own nukes." See William Arkin, "New Nukes? No Way," *Los Angeles Times*, August 17, 2003.

<sup>52</sup> *An Assessment of the Impact of Repeal of the Prohibition on Low Yield Warhead Development on the Ability of the United States to Achieve its Nonproliferation Objectives*, jointly submitted to the Congress by the Secretary of State, Secretary of Defense, and Secretary of Energy, March 2004, p. 4.

<sup>53</sup> An official with the Bush Administration's National Security Council staff has stated that "Russia's theater nuclear weapons, even if modernized, will not give Moscow the capability to alter the strategic landscape." He further noted that "Russia's theater nuclear weapons are (continued...)

concerns about Russia's nonstrategic nuclear weapons, such as negotiated transparency or arms control measures, could undermine U.S. flexibility and limit U.S. and NATO options for the deployment of nonstrategic nuclear weapons. Specifically, "pursuing arms control agreements on these weapons might undercut NATO's nuclear posture, generating political pressure to withdraw the remaining weapons." In addition, "arms control would make problematic the development of new [nonstrategic nuclear weapons] capabilities that may be required to deter and defend against today's threats, and, especially, for the deterrence of rogue states armed with weapons of mass destruction."<sup>54</sup>

**Reduce Reliance on Nuclear Weapons.** Many analysts believe the United States should adopt a policy that reduces its reliance on nuclear weapons, in general, and weapons with battlefield objectives, in particular. The Bush Administration argues that its policy achieves this objective, by including missile defenses and precision strike conventional weapons in its new "triad" of U.S. forces and capabilities. Others, however, argue that the Administration's policy actually blurs the distinction between conventional and nuclear weapons, and may increase the U.S. reliance on nuclear weapons by adding to the contingencies when the United States would consider nuclear use. They argue, instead, that the United States should adopt a "no first use" pledge, so that the United States would make it clear that it would not use nuclear weapons against non-nuclear states. At present, the United States does not explicitly threaten to use nuclear weapons, but it also will not rule out their use. Supporters of the existing policy argue that this ambiguity enhances deterrence, by keeping the possible prospect of nuclear attack in the adversary's calculations.

Those who support a "no first use" pledge argue that it would reduce the perceived value of nuclear weapons, indicating that they serve only as a deterrent to the use of nuclear weapons by other nations. Many believe that this change in policy would not hinder U.S. deterrent strategy or U.S. security because they believe that the U.S. nuclear deterrent is robust, with thousands of deployed nuclear warheads, and that U.S. conventional forces are sufficient to address any potential or emerging threats to U.S. security. This includes the potential need for the United States to attack hardened and deeply buried targets, including those that might house chemical or biological weapons. The United States could use its conventional weapons to seal off entry and exit points and to cut off communications and ventilation,<sup>55</sup> thereby "sealing" chemical or biological weapons in place in their underground bunkers for the duration of a conflict. The United States could then remove and dispose of these weapons after winning the conflict, without risking dispersing them and creating fallout with a nuclear attack.

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<sup>53</sup> (...continued)

not... destabilizing." See Robert Joseph, "Nuclear Weapons and Regional Deterrence," In Larson, Jeffrey A. and Kurt J. Klingenberger, editors, *Controlling Non-Strategic Nuclear Weapons: Obstacles and Opportunities*, United States Air Force, Institute for National Security Studies, July 2001, p. 90.

<sup>54</sup> *Ibid.*, p. 92.

<sup>55</sup> Stansfield Turner, "Nukes: Can U.S. Practice What it Preaches?," *Christian Science Monitor*, January 28, 2004.

Some have also argued that, if the United States and NATO reduce their reliance on nuclear weapons, possibly even withdrawing nonstrategic nuclear weapons from Europe, Russia might also alter its policy. Others, however, argue that Russia's policy is only rhetorically linked to NATO policy, and with continuing concerns about weaknesses in its conventional forces, Russia is unlikely to respond with its own change in policy. Some also believe that changes in U.S. and NATO policy could affect the policies of other nations with nonstrategic nuclear weapons, such as India, Pakistan, or China, by demonstrating that the United States has reduced its reliance on nuclear weapons. Others, however, point out that these nations have acquired their nuclear weapons to address their own security interests, and are unlikely to alter limit their forces simply because the United States and NATO have set an example of reductions.

**Cooperative Responses.** Analysts have noted that the only arms control measures affecting nonstrategic nuclear weapons, the 1991 PNIs, do not require data exchanges and did not establish monitoring provisions so each nation can be certain that the other is adhering to its commitments. They also are voluntary; because they are not incorporated in a formal treaty or agreement. Either side could reverse its commitments at any time. Hence, the reductions under these measures may be vulnerable to disruptions in the relationship between the United States and Russia. Those who believe that U.S. and Russian nonstrategic nuclear weapons continue to pose a threat to international security, either because of the prospects for loss of control over Russian weapons or deliberate use by either nation, argue that the United States and Russia should pursue further cooperative measures to address the perceived threats from the weapons and the perceived weaknesses in the existing controls on them. Congress has also voiced its interest in these the future of these weapons. Section 1212 of the FY2006 Defense Authorization Act (P.L. 109-163) calls on the Secretary of Defense to determine whether it is in the U.S. national security interest “to identify and develop mechanisms and procedures to implement the transparent reductions in nonstrategic nuclear weapons” and “to identify and develop mechanisms and procedures to implement the transparent dismantlement of excess nonstrategic nuclear weapons.”

Analysts outside government have offered several proposals for cooperative measures that might address concerns with nonstrategic nuclear weapons:

**Increase Transparency.** Many analysts argue that the United States and Russia should, at a minimum, provide each other with information about their numbers of nonstrategic nuclear weapons and the status (i.e. deployed, stored or awaiting dismantlement) of these weapons. Such information might help each side to monitor the other's progress in complying with the PNIs; it could also help resolve questions and concerns that might come up about the status of these weapons or their vulnerability to theft or misuse. The United States and Russia have discussed transparency measures for nuclear weapons in the past, in a separate forum in the early 1990s, and as a part of their discussions the framework for a START III Treaty in the late 1990s. They failed to reach agreement on either occasion. Russia, in particular, has seemed unwilling to provide even basic information about its stockpile of nonstrategic nuclear weapons. Some in the United States have resisted as well, arguing, in particular, that public discussions about the numbers and locations of U.S.

nuclear weapons in Europe could increase pressure on the United States to withdraw these weapons.

***Expand Threat Reduction Assistance.*** In the early 1990s, as a part of the early efforts of the Cooperative Threat Reduction Program, the United States provided Russia with assistance in transporting nuclear weapons back to Russia from other former Soviet republics. It has also provided Russia with assistance in improving security at its central storage facilities for nuclear weapons. However, much of this assistance focused on the warheads removed from strategic nuclear weapons, rather than nonstrategic nuclear weapons. Because many nonstrategic nuclear weapons remain at remote storage areas near former deployment areas, and concerns remain about security at these facilities. Some analysts have suggested that the United States could expand its threat reduction assistance to these sites, so that it could build confidence in the safety and security of these weapons. Others, however, argue that the United States should only provide assistance at sites that support the retirement or elimination of nuclear warheads and should not provide funding for sites that can support the weapons' continued deployment. Some have also questioned whether Russia would accept assistance at these sites, particularly if it were not permitted reciprocal access to U.S. weapons storage sites. Russia did, however, recently conduct an exercise, with NATO observers and CTR funding, to explore the vulnerability of its nuclear weapons storage sites to incursions and theft.

***Negotiate a Formal Treaty.*** Several analysts have suggested that the United States and Russia negotiate a formal treaty to both codify the measures outlined in the PNIs and to put further limits and restrictions on each nation's nonstrategic nuclear weapons. Such an agreement could mandate further reduction in deployed weapons, including U.S. weapons in Europe, and could result in both nations reducing their reliance on these weapons in their military strategies. Some analysts have also argued that this treaty could be multilateral, to include nations such as China, India, and Pakistan, rather than bilateral, thus introducing arms control limits to the forces of other nations with nonstrategic nuclear weapons.

However, as have been noted throughout this report, the two sides would likely find it difficult to agree on a definition of which weapons counted as nonstrategic nuclear weapons, particularly if either nation begins to deploy warheads designed to achieve battlefield objectives on long-range or strategic delivery vehicles. The issue would be further complicated by the fact that both the United States and Russia hold many of these warheads in storage, and some could conceivably return to deployment in a relatively short amount of time. To address these problems, some analysts have suggested that the arms control regime count and limit all warheads — stored and deployed, strategic and nonstrategic, etc. This type of agreement would allow each side to determine, for itself, the size and mix of its deployed forces, within the limits on total warheads.<sup>56</sup> Critics argue that such limits would be extremely difficult to

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<sup>56</sup> “The only way to get a real handle on NSNF security, and the relationship of these weapons to strategic arms control and the real military threats they pose (while maintaining some capability) is the warhead control route.” See Joseph F. Pilat, “Controlling Nonstrategic Nuclear Forces,” in Larson, Jeffrey A. and Kurt J. Klingenberg, editors, (continued...)

define and monitor, making it difficult to verify compliance with a warhead-control treaty. They also note that the lack of symmetry between U.S. and Russian forces would make it extremely difficult to find common definitions and limits that addressed each nations' concerns. In particular, because Russia views U.S. NATO weapons as a threat to its security, it could insist on the complete removal of these weapons in exchange for less comprehensive limits on the far greater numbers of Russian forces.<sup>57</sup> Further, the other nations with nonstrategic nuclear weapons seem unlikely, at this time, to be willing to join a regime that would limit their capabilities.

Analysts recognize that negotiating such an agreement would be complex and time-consuming. But it suffers from still another problem. Neither the Russian nor U.S. governments have expressed any interest in pursuing this path. Russian officials have denied that their weapons pose a safety and security problem, and they still consider these weapons essential to Russian military strategy and national security. The Bush Administration has also shown no interest in negotiating further limits on U.S. nuclear warheads or weapons. To the contrary, in the 2002 Strategic Offensive Reductions Treaty (Moscow Treaty), the United States indicated that it would only count "operationally deployed" strategic nuclear warheads under the limits in the Treaty. This metric counts fewer warheads than the START Treaty, and far fewer than a metric that would include stored and deployed strategic and nonstrategic nuclear warheads. The Bush Administration has resisted more confining arms control measures, arguing that the United States must maintain the flexibility to adjust its forces and redeploy warheads to respond to changes in the international security environment.

Nevertheless, analysts who view these weapons as a threat to U.S., Russian, and international security maintain that circumstances could change and a bilateral or multilateral treaty could address many concerns. For example, if the United States and NATO reconsider the military utility of forward deployed nuclear weapons, and as Russia's economy and conventional forces recover more of their stability, both sides might grow more willing to accept limits on their forces if it allows for greater openness and transparency at both storage and deployment areas. Although it is harder to imagine other nations relinquishing their nonstrategic nuclear weapons, some contend that a treaty that established a norm against nonstrategic nuclear weapons, combined with diplomatic efforts to address security concerns, could alter the perceptions of these nations, as well.

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<sup>56</sup> (...continued)

*Controlling Non-Strategic Nuclear Weapons: Obstacles and Opportunities*, United States Air Force, Institute for National Security Studies, July 2001, p. 243.

<sup>57</sup> Robert Gromoll and Dunbar Lockwood, "Nonstrategic Nuclear Weapons: Defining U.S. Objectives," in Larson, Jeffrey A. and Kurt J. Klingenger, editors. *Controlling Non-Strategic Nuclear Weapons. Obstacles and Opportunities*, United States Air Force, Institute for National Security Studies, July 2001, p. 82.