Report

U.S.-Russian Security Cooperation and SORT

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The agreed Strategic Offensive Reductions Treaty (SORT), signed in May 2002, permits both Moscow and Washington to reduce significantly their deployed and accountable strategic nuclear weapons. In addition, the treaty protocols permit "freedom to mix," allowing each side to achieve its preferred mix of land-based, sea-based, and air-launched nuclear weapons. Those who favor SORT contend that it preserves and improves strategic stability while reducing the numbers and cost of both states' deployed nuclear arsenals.

The issue of U.S.-Russian offensive force reductions overlaps with the question of whether either or both sides will, or should, deploy missile defenses. The Bush administration abrogated the ABM Treaty of 1972 and has begun the deployment of a limited national missile defense (NMD) system based on non-nuclear intercept technology. Russian President Vladimir Putin accepted the U.S. decisions on the ABM Treaty and missile defense as accomplished facts and indicated Russia's willingness to explore possible U.S.-Russian and NATO-Russian cooperation on NMD or theater missile defense.

This article considers how SORT reductions would affect U.S. and Russian security by comparing alternative U.S. and Russian SORT-compliant force postures. In addition, the study considers the implications of introducing various levels of antimissile defenses into the equation of offensive force reductions. Analysis of the relationship between offensive force reductions and pending defense deployments also requires some commentary on the principles of deterrence and how our understandings of deterrence might, nor might not, depart from past precedent and practice. The first part of the study emphasizes important policy aspects of the problem, whereas the second focuses on the analysis of pertinent data.

A number of analysts argue that nuclear weapons should be marginalized or abolished in the new world order and contend that nuclear deterrence is irrelevant to the future U.S.-Russian political relationship.[2] This article moves in a different direction: It assumes that careful management of the future U.S.-Russian security relationship is part of anyone's way station to better worlds, however those preferred end states are defined. For this purpose, the assumed obsolescence of deterrence or deterrence stability as an important constituent of world order is premature. In addition, developments affecting nuclear deterrence and arms control between America and Rus-

sia reverberate into the larger international system, in particular affecting the mix of incentives or disincentives for controlling the spread of nuclear weapons.

REDEFINING OR ADJUSTING DETERRENCE?

The Bush administration's decision to withdraw from the ABM Treaty, effective June, 2002, was the final step in recasting the nuclear relationship between the United States and post-Soviet Russia. Only a few years earlier, Russia would have reacted with public alarm and considerable resistance to such a move. But the rapprochement between Moscow and Washington that had already taken place following the 9/11 terrorist attacks had precluded more than a notional Russian protest against what amounted to a U.S. fait accompli.

The U.S. arguments for moving beyond the ABM Treaty were based on political and military factors. The end of the Cold War and the demise of the Soviet Union moved the United States and Russia into a new world order unforeseen by the architects of the ABM Treaty. In the post-Cold War world, the U.S.-Russian relationship could be regarded as politically nonhostile, if not necessarily warm and fuzzy. A nonhostile U.S.-Russian political relationship places into doubt the entire Cold War system of military security, including the nuclear arms control regimes developed to support that security.

Implicit in the evolving U.S.-Russian political climate was increased uncertainty for military planners in both countries. The very concept of nuclear deterrence and its application to the post-Cold War world came under siege.[3] After taking office in 2001, the Bush administration, noting that the spread of weapons of mass destruction (WMD) to rogue state actors or non-state actors now constituted a serious threat to U.S. security, insisted that preemption and defenses would have to supplement deterrence. Deterrence would be one part of a larger system of interlocking concepts for threat assessment and response. This contrasted with the much heavier reliance on deterrence that guided U.S. policy during the Cold War. The new, more complicated paradigm for threat management left the issue of deterrence "sufficiency" as defined during the Cold War in a state of uncertainty and signaled the necessity for a reassessment.

The Bush administration paradigm for nuclear threat assessment and the improvement in U.S.-Russian political relations both suggest some rethinking of the role of strategic missile defenses in the two states' security policies. The Cold War assumption was that missile defenses were destabilizing because they interfered with confidence in the "assured retaliation" of either side. Assured retaliation was based on a sufficient number of surviving and retaliating nuclear warheads on strategic missile launchers or intercontinental bombers. In addition to the argument that missile defenses were undesirable during the Cold War, U.S. leaders and strategic analysts also argued that missile defenses were technically infeasible. Despite considerable research and development by both states and their deployment of limited ballistic missile defense (BMD) systems permitted by the ABM Treaty, their offensive forces were always more than sufficient to overwhelm any defenses that could be designed or deployed.

The end of the Cold War recast the missile defense debate in terms of new threats from rogue states and accidental launches. After the experience of the Gulf War, many analysts argued that missile defenses, limited in size and adaptive in technology, could be useful in deterring or defeating small attacks. Instead of relying solely upon deterrence by threat of unacceptable retaliatory destruction, defenses would extend deterrence by denying the attacker its objectives. The possibility of "thin" but effective missile defenses offered the possible return of the security paradigm to something more akin to that of the pre-nuclear era. The unfamiliar and exceptional Cold War total domination of defenses by offenses might be replaced by a competition between offensive and defensive strategies and supporting technologies: a pattern familiar from most of military history.

More recently, the Bush administration has since shifted its position slightly, moving away from its initial optimism that nuclear deterrence might be superseded entirely by a more benign U.S.-Russian political relationship. U.S. policy now appears to recognize that a residual deterrence relationship will have to remain between the two states, based on continuing confidence in assured retaliation. Assured retaliation is now seen as necessary, not because of the possibility that the other country will launch a disarming preemptive attack, but as a hedge against an accidental or inadvertent strike based on technical malfunctions, rogue commanders, or mistaken warnings.[4] In other words, deterrence is now more directly related to "software" failures (machine and human) than it is to a more traditional security competition. In this regard, defenses offer some new possibilities as putative constituents of a stable deterrent.

For defenses to become more competitive with offenses and offer realistic options for U.S. and Russian policymakers, however, the legacy forces left over from

the Cold War and the 1990s would have to be reduced in size and adjusted in character. For either the U.S. or Russia to begin to deploy limited missile defenses based on new technologies, while strategic nuclear offensive forces remained at or near their 1990s levels, would invite suspicion that an escape from deterrence into a position of nuclear superiority was being attempted. (The same point does not apply, however, to reducing offenses without deploying defenses, as will be outlined below.) Recognizing this situation, the United States and Russia signed the SORT Treaty, which requires each state to reduce its operationally deployed nuclear warheads to between 1,700 and 2,200 by 2012. Implementing this agreement will require significant reductions from the numbers of U.S. and Russian warheads actually deployed in 2002. Table 1 summarizes those deployments.

TABLE 1
RUSSIAN AND U.S. STRATEGIC NUCLEAR FORCES, 2002

Russian Forces	Launchers	Warheads @	Total Warheads
SS-11/3	0	1	0
SS-17	0	10	0
SS-18	144	10	1,440
SS-25 silo	0	1	0
SS-19/3	140	6	840
SS-27 silo	29	1	29
Sub-total fixed land	313		2,309
SS-25 (road)	360	1	360
SS-24 (road)	36	10	360
Sub-total mobile land	396		720
Sub-total land-based	709		3,029
SS-N-6/3	0	1	0
SS-N-8/2	0	1	0
SS-N-18/2	112	3	336
SS-N-20	60	2	120
SS-N-23	112	3	336
Sub-total sea-based	284		792
Tu-95 H 6 / ALCM	29	6	174
Tu-95 H 16	34	16	544
Tu-160 Blackjack	15	12	180
Sub-total air-breathing	78		898
Total Russian forces	**1071**		**4,719**
U.S. Forces	**Launchers**	**Warheads @**	**Total Warheads**
Minuteman III	150	1	150
Minuteman III	50	3	150
Minuteman IIIA	300	3	900
Peacekeeper MX	50	10	500
Sub-total land-based	550		1,700
Trident C-4	168	6	1,008
Trident D-5/W-76	216	8	1,728
Trident D-5/W-88	48	8	384
Sub-total sea-based	432		312
B-52H ALCM	97	14	1,358
B-2	21	16	336
Sub-total air-breathing	118		1,694
Total U.S. forces	**1,100**		**6,514**

Source: Center for Defense Information, http:www.cdi.org/issues/nukef&f/database/startab.html, January 21, 2003, plus author's estimates.

The potential for defenses to subvert deterrence unless accompanied by offensive force reductions does not imply that offensive force reductions should not be undertaken unless defenses are deployed. U.S. and Soviet offensive force reductions took place during the Cold War without defenses. These reductions were grounded in the two-sided reassurance, embodied in the ABM Treaty, that neither state would undertake to build or deploy national missile defenses. The international security environment is different now, to be sure. The U.S.-Soviet political suspicions of the Cold War have given way to post-Cold War and 21st century security collaboration on a variety of issues, including deterrence. So Russians and Americans, now less suspicious of one another, could reduce their offenses, with or without defenses, depending on their operative theories of deterrence and stability.

There are three possible assumptions about the relationship between offensive force reductions and national missile defense deployments:

1. Defenses support offensive force reductions, because they provide additional reassurance against deterrence failure based on assured retaliation.
2. Defenses make offensive force reductions harder to accomplish, because the deployment of defenses increases distrust and fears of a technology breakthrough that might favor only one side.
3. Deploying defenses and shrinking offenses are independent policy and arms control objectives, and the relationship between future defenses and offenses remains open for new definitions.

The Bush administration favors the first argument and partly embraces the third perspective, while treating the second view as a relic of the Cold War. But the second point of view is not necessarily irrelevant to post-Cold War security and to a less polarized U.S.-Russian security relationship. Even if both the United States and Russia accept the first or third perspective on the relationship between defenses and reduced offenses, strategic stability includes crisis stability as well as arms race stability. Crisis stability emphasizes the avoidance of force postures and operational behaviors that raise the risk of accidental or inadvertent war. Defenses that, combined with offenses, cause either the United States or Russia to fear for the survival of its residual deterrent based on assured retaliation could encourage the adoption of force postures that raise the risk of accidental war.

As an examination of pertinent scenarios and data reveals, the possible impact of defenses on crisis stability remains significant so long as Russia remains dependent on prompt launch and/or high levels of peacetime alert for stable deterrence, as compared to U.S. doctrines and operational procedures. The vulnerability of Russian forces to a U.S. first strike without launch on warning could be increased by U.S. defenses that worked really well, beyond those necessary to deflect attacks from rogue states or accidental launches. Therefore the size and capabilities of U.S. defenses must fit into a niche between intimidation and incapacity if they are not to destabilize the U.S.-Russian strategic relationship. Overinflated defenses could destroy arms race stability and make crises harder to resolve. At the other end of the spectrum, Potemkin defenses that are actually very leaky could invite prompt preemption and also fail to perform their assigned missions if needed. Another key point is that once defenses are no longer hypothetical or prototype but actually deployed, their expected performance will become a psychological component of the nuclear deterrent relationship between Russia and the United States.

SORTING OUT SORT

The United States and Russia have a number of options in moving from their current force deployments to the reduced totals required under SORT. These options include various combinations of land- and sea-based ballistic missiles and bombers. The SORT Treaty places no limitations on the "freedom to mix" for either signatory. Unlike the proposed START III agreement, SORT, does not prohibit Intercontinental Ballistic Missiles (ICBMs) with multiple independently targetable reentry vehicle (MIRV) warheads. The removal of this limitation, which had been a key feature of the START II Treaty, represented a U.S. concession to what it perceived as Russian requirements. A number of the more important classes of Russian ICBMs are scheduled to go out of service within the next decade and Russia might want to retain the option of MIRVed ICBMs even at greatly reduced total deployments, compared to current forces. Maintaining a larger force of single-warhead missiles might be too expensive for Russia.

The Russian economy, although not as weak as during the 1990s, nevertheless imposes greater limits on Russian force modernization than the United States will face. Russian defense experts now anticipate that the government will be able to fund one main line of ICBM modernization: the Topol-M (SS-27) that may be deployed in either fixed or mobile basing. The Russian Security Coun-

cil plan of 1998 anticipated that about 300 of these single-warhead missiles would be deployed by the end of 2008, but it would be prudent to expect shortfalls.[5] The Russian ballistic missile submarine (SSBN) force has fallen on hard times. There now remain an estimated total of 17 SSBNs in active service: seven Delta III, seven Delta IV, and three Typhoon class boats.[6] Russia has reportedly authorized the construction of a new class of ballistic missile submarine: the *Yuri Dolgorukii* (the first named in the series) or Project 955 class, but the follow-through on this program is uncertain, and it may be delayed until a new submarine launched ballistic missile (SLBM) is available.[7] Russian officials now deny some media reports that none of their strategic submarines patrolled outside Russian contiguous territorial waters during 2002, but serious operational problems persist.

Projecting Russian nuclear force posture in 2012 is therefore fraught with more uncertainties than a similar projection for the United States. The U.S. treaty-compliant force for 2012 would probably consist of some 500 single warhead ICBMs, about 1,400 warheads deployed on ballistic missile submarines, and about 300 warheads on long-range bombers, assuming the United States selects a "balanced triad" configuration. The treaty does not mandate such balance, however; other treaty-compliant mixes of launchers can be proposed. If the balanced triad is selected for deployment in 2012, it will almost certainly rely on 14 Ohio-class SSBNs with two additional boats in overhaul. Experts anticipate that the United States would, as part of a balanced triad for 2012, also deploy 500 single warhead Minuteman III ICBMs and a mix of B-2 and B52-H bombers.[8]

It might seem self-evident to some observers that the balanced triad of U.S. or Russian forces would be the best option under SORT limitations. The following sections of this article, however, will assume that this question merits further investigation. To that end, it will consider some alternative force structures for each state and their attributes.

There are three reasons to undertake this examination. First, an examination of the outcomes of nuclear force models in each case will help to determine whether some deployment mixes, as opposed to others, might be more crisis stable or arms control stable. Crisis stability refers specifically to the avoidance of mutual suspicion about first strike intentions, based on a perceived relative advantage in first or second strike forces. Arms control stability implies that the forces are sufficiently redundant in their survivability and employment flexibility to ensure that no surge production or imminent technology breakthrough by another state would place deterrence in jeopardy.

A second reason to examine the properties of alternative offensive deployments for the United States and Russia in 2012 is to estimate the impact of defenses on stability in this context. For this purpose, statistical refinements will be added to the model of offensive force interactions. Defenses of variable competency will be tested against the alternative forces that might be deployed under SORT limits. The results will provide a template for the comparison of survivable forces with and without defenses and under various deployment conditions.

A third purpose in comparing alternative forces is to ascertain whether U.S. and Russian launchers and warheads could be reduced safely even below the agreed SORT levels. Neither the U.S. nor the Russian government has expressed official interest in doing so. Nevertheless, if the SORT agreement is fully implemented and if defenses become feasible, the two states might collaborate in a defense-protected build-down of offenses below the 2012 targets. The decision would be complicated by the requirement, not only to balance offenses, but also by the march of missile defense technology and how fast it was assumed to progress.

The changing political climate between the United States and the Russian Federation might open the door to an agreed arms control regime with greater emphasis on defenses, and less on offensive forces. The United States has offered to work with Russia on some technical aspects of BMD. The two countries have held several joint missile defense exercises in recent years. Russian Defense Minister Sergei Ivanov stated in January, 2003, that—the state of Russia's economy permitting—Russia would feel free to develop its own missile defense systems similar to those being planned by the United States. U.S. Defense Secretary Donald Rumsfeld offered no objection to Ivanov's view of Russia's future options. Noting that Russia had deployed missile defenses around Moscow for many years, Rumsfeld said that expansion of those defenses would reflect Russia's concern, shared with America, about the threats posed by the spread of WMD and ballistic missiles.[9]

The possibility of a condominium of sorts between the United States and Russia on limited national missile defenses is not a certainty. The two countries have convergent, but not identical, interests. Russia and the United States share a concern about WMD and missile proliferation. The North Korean decision in the fall of 2002 to abrogate the 1994 Agreed Framework, designed to con-

strain North Korean ability to mass produce nuclear weapons, was an especially informative benchmark for U.S. and Russian observers of proliferation. The North Korean use of coercive nuclear diplomacy to extract concessions from the United States, Japan, and South Korea signaled something more important than a single bump in the nonproliferation road. It called attention to the new geopolitics of proliferation. The spread of nuclear weapons and ballistic missiles outside of Europe, especially in Asia, will be the center of gravity for threat assessors in the 21st century.[10] And Asian powers like North Korea with nuclear assembly lines could encourage copycat or offsetting programs, as in Japan or South Korea. Or rogue states like North Korea could transfer nuclear know-how and technology, including fissile materials, to terrorists.

Despite these shared concerns about the risks of Asian proliferation, the United States and Russia have some potential points of disagreement that play into their optimism or pessimism about a defense buildup and an offensive build down. In a reversal of the Cold War situation, the 21st century finds Russia in a position of conventional military inferiority relative to the United States and NATO. Therefore, Russia's claim to great power status rests entirely on the viability of its nuclear arsenal. Russia's nuclear credibility, in turn, requires that Russia appear to have a strategic nuclear capability that is roughly equivalent to that of the United States. An approximately equivalent Russian nuclear deterrent is one that may lack some of the technological bells and whistles of U.S. forces, but nevertheless can, at least, perform retaliatory missions sufficient to cause unacceptable societal damage to the United States. Following this logic, Russia will be loath to reduce its forces to levels below SORT limits, unless British, French, and Chinese nuclear forces undergo proportionate reductions: not a good bet. In short, Russia wants a clear hierarchy of nuclear powers with the strong perception that the United States and Russia remain in a singular class.

These Russian expectations about the future viability of Russia's deterrent imply that the management of offensive force reductions and defense deployments is a challenge to the technical ingenuity and to the political flexibility of leaders in Washington and in Moscow. Defense deployments could help to accelerate a military-strategic condominium or, if managed poorly, could reopen the sores of distrust that characterized U.S.-Soviet relations in the Cold War. In this regard, not only the numbers of defenses and offenses deployed, but also the qualities and character of these weapons, become important as deterrence based on "retaliation only" is transformed into deterrence based on both the threat of punishment and the capability for denial.

ANALYZING ALTERNATE FORCE STRUCTURES

This section presents analyses conducted in order to answer questions about possible offensive force structures compliant with SORT and the implications of introducing defenses. The first task is to develop alternative force postures for Russia and for the United States by mixing and matching types of launchers in different combinations. The combinations used in this analysis are listed in Table 2 by generic type—details appear in the Appendices.

TABLE 2
ALTERNATE FORCE STRUCTURES: SORT

Russia	United States
Balanced Triad	Balanced Triad
No Bombers	No Bombers
No SLBMs	SLBMs Only
ICBMs Only	No ICBMs

Source: Author

Each force was developed in two variations: a larger, SORT-compliant force within the 2,200 warhead limit; and a smaller, SORT-compliant force within the 1,700 warhead limit. (Force structures are summarized in Appendices 1 and 2). The first step was to use a force exchange model to calculate and compare the numbers of surviving and retaliating second strike U.S. and Russian warheads for each of the various force structures.

With regard to crisis stability, the qualities of forces may matter more than the numbers of weapons do. Crisis stability essentially asks whether nuclear forces and launch doctrines are forward leaning or rearward looking: Are they dependent on prompt launch and/or high levels of alert for survivability, or can they rely on launch after retaliation and lower peacetime levels of alert? Our model permits us to investigate aspects of this question with respect to the American and Russian forces previously described. We can contrast their relative degrees of reliance on prompt launch or generated (raised) alert. To do so, we compare the numbers of surviving and retaliating

warheads (following an attack) for each side under four operational conditions (see Figures 1-4):

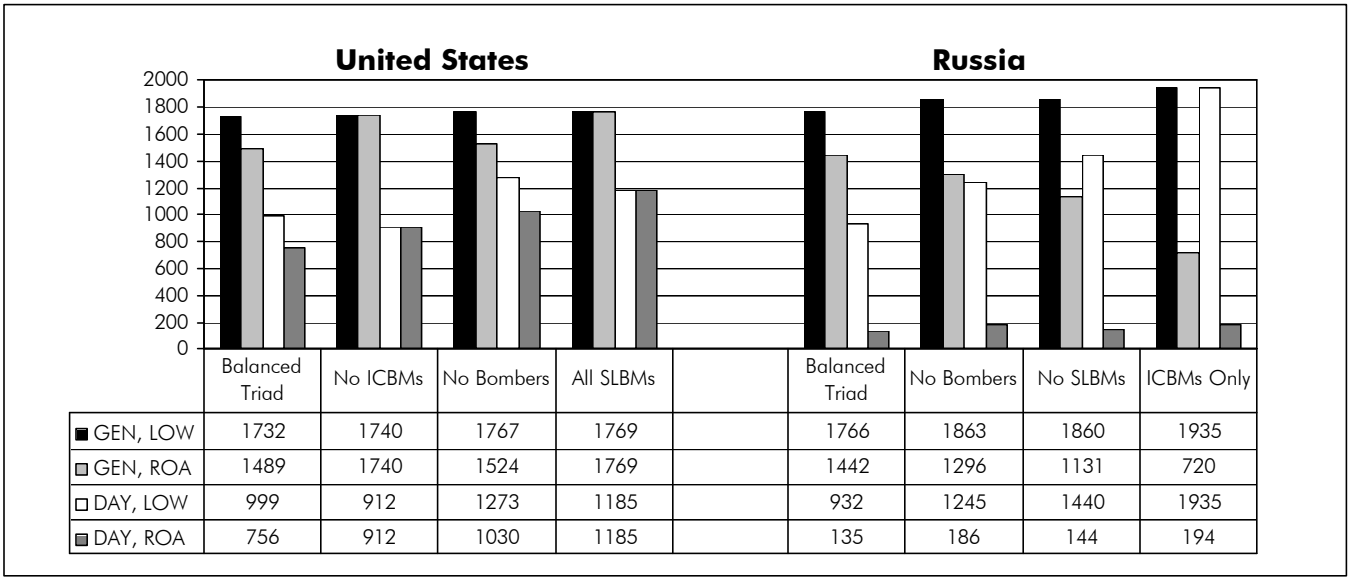
1. Forces on generated alert and launched on warning (GEN, LOW)
2. Forces on generated alert and riding out the attack (GEN, ROA)
3. Forces on day-to-day alert and launched on warning (DAY, LOW)
4. Forces on day-to-day alert and riding out the attack (DAY, ROA).

The results of comparisons for the 2,200 level and the 1,700 level are summarized in Figures 1 and 2, respectively.

Suveying the results of this analysis uncovers several points. First, there appear to be no cases in which the number of either side's surviving and retaliating warheads falls below the threshold of assured retaliation—even within an initially deployed limit of 1,700 warheads. In all but a very few cases, each side can deliver several hundreds of warheads after absorbing a first strike, even when the defender is at low levels of alert. There are, however, significant differences of degree between Russia's performance under minimum retaliation conditions (DAY, ROA) and the outcomes for the United States under similar conditions, especially within an initially deployed force of 1,700 weapons. However, these disparities in relative numbers of surviving warheads do not remove the United States from the condition of societal vulnerability that is regarded as essential to deterrence based on assured retaliation.

It's worth addressing the issue here: How "assured" does assured retaliation need to be? The answer must be a sliding scale and an adaptive construct, instead of a one-time metric that floats all boats. The standard proposed by former Secretary of Defense Robert McNamara—400 equivalent megatons inflicted against a variety of retaliatory targets—was an influential Cold War benchmark. Under the now much different political conditions, this number is obviously excessive as a current or future requirement for U.S. or Russian forces. Alternative definitions for assured retaliation would be based on subjective expectations of vulnerability and acceptability. In this regard, a few nuclear weapons can have a great deal of deterrent effect. The 1962 Cuban missile crisis was instructive: Despite evident U.S. nuclear superiority, leaders' expectations about the possible consequences of even one or two U.S. cities destroyed by Soviet nuclear weapons motivated President Kennedy and his advisors to find a way to compel the Soviets to remove their missiles from Cuba without a U.S. resort to air strikes or an invasion of Cuba. Therefore, one might reasonably posit that the

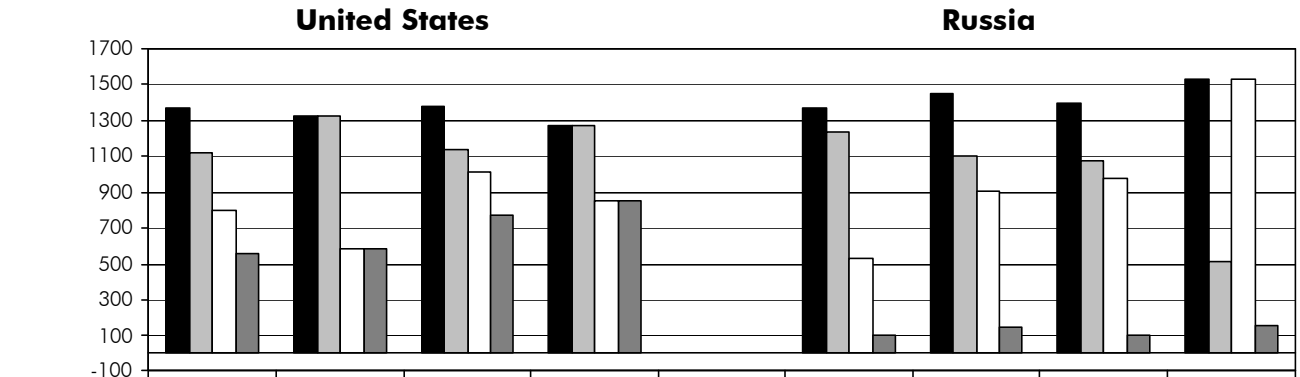
FIGURE 1
ARRIVING RETALIATORY WEAPONS: 2,200 LIMIT



	Balanced Triad	No ICBMs	No Bombers	All SLBMs		Balanced Triad	No Bombers	No SLBMs	ICBMs Only
GEN, LOW	1732	1740	1767	1769		1766	1863	1860	1935
GEN, ROA	1489	1740	1524	1769		1442	1296	1131	720
DAY, LOW	999	912	1273	1185		932	1245	1440	1935
DAY, ROA	756	912	1030	1185		135	186	144	194

Source: Author, based on a model developed by Dr. James Scouras, Strategy Research Group.

FIGURE 2
ARRIVING RETALIATORY WEAPONS: 1,700 LIMIT



	Balanced Triad	No ICBMs	No Bombers	SLBMs Only		Balanced Triad	No Bombers	No SLBMs	ICBMs Only
GEN, LOW	1367	1322	1381	1270		1367	1448	1396	1530
GEN, ROA	1124	1322	1138	1270		1233	1100	1072	518
DAY, LOW	802	585	1015	851		532	909	977	1530
DAY, ROA	559	585	772	851		95	145	98	153

Source: Author, based on a model developed by Dr. James Scouras, Strategy Research Group.

credible threat to destroy several major metropolitan centers and/or effective postattack control of the enemy's armed forces by its government and military leadership would satisfy the "enough" criterion for those politicians and generals not beyond desperation or insanity. But this flexible criterion is always subject to erosion at the margin: History offers up examples of leaders too blinkered or desperate, and generals too hidebound or preemption prone, for complacency in these matters.

Second, it is more likely that the United States or Russia would be retaliating with forces either on high alert or launched on warning. Soviet retaliatory doctrine during the Cold War was explicit in its willingness to launch on warning if warning was deemed sufficiently credible by the national command authority. U.S. Cold War declaratory policy was to ride out an attack and retaliate, but some force elements were thought to be constantly in readiness for prompt retaliatory launch. Present U.S. and Russian forces capable of prompt launch include ICBMs and SLBMs that are available on station. Under a SORT treaty with 2,200 limits, the United States would probably deploy some 500 land-based and 1,400 sea-based warheads. ICBM warheads are maintained in a constant high state of readiness for prompt launch, and many SLBMs could be raised to higher alert and readied for launch in good time. Other SLBMs would be withheld from initial strikes for retaliation or to serve as part of a strategic reserve. Bombers are strictly delayed launch forces, although they can be raised to higher alert levels during a crisis in order to increase their survivability.

U.S. SORT forces will be more survivable and less dependent upon prompt launch and crisis-time alerting than their Russian counterparts. How much more survivable will depend on many variables, including Russian modernization choices between now and 2012. If Russia prefers to maintain a balanced triad under SORT, then it will have to deploy a new class of ballistic missile submarine while maintaining some remnant of its existing forces that, even now, face obsolescence. Even worse than the lack of suitable force structure in the SSBN component of a future Russian triad is the deficiency of operational experience and training for crews and command systems. Russia faces a series of fiscally painful and strategically controversial decisions with regard to the composition of its SORT and post-SORT strategic nuclear forces. This situation might motivate Russia to trade down to lower levels of offenses on both sides—say to 1,000 deployed warheads or so—but for the United States and Russia to reach such an agreement, the process of vertical disarmament would have to be "multilateralized" to include other powers.

Russia's economic realities will allow it less "freedom to mix" among nuclear delivery systems, compared to U.S. options. If present trends continue, Russian military leaders will stick to a triad of ICBMs, SLBMs, and bombers. Modernization may be restricted to a single class each for ICBMs and SLBMs, with the land-based missiles continuing to carry the major burden of deterrence and showing the most reliable performance parameters in testing. For the United States, the military argument that a triad complicates the calculations of a potential attacker when compared to a dyad or monad will almost certainly continue to prevail. In addition, interservice politics and the law of inertia argue for the maintenance of a U.S. triad that remains in place through the deadline for SORT reductions. Nevertheless, a review of the numbers summarized in Figures 1 and 2 demonstrates that, under various conditions of assumed alertness and launch doctrine for either side, a balanced triad is not necessarily the option providing the greatest possible number of surviving and retaliating weapons.

The preceding point is worth some emphasis, but not an overstatement. Analysis shows that under some conditions, a dyad of bombers and submarines might provide the United States with equal or better retaliatory capabilities than a triad. However, political realities make it unlikely that the U.S. Congress and military services could be talked into phasing out either bombers or land-based or submarine-launched ballistic missiles entirely. What may be within the realm of political feasibility, however, is shifting the relative weight of the various legs of the triad: As force numbers go down to meet the SORT limits, the importance of submarines relative to bombers and land-based missiles could increase, for example. Such an evolution would be stabilizing from the U.S. standpoint, but Russia would take a more equivocal view. U.S. Trident ballistic missile submarines equipped with highly accurate D-5 SLBMs have significant first strike capabilities against Russian missile silos. So this particular evolution in the structure of the triad would not necessarily improve crisis stability.

DEFENSES

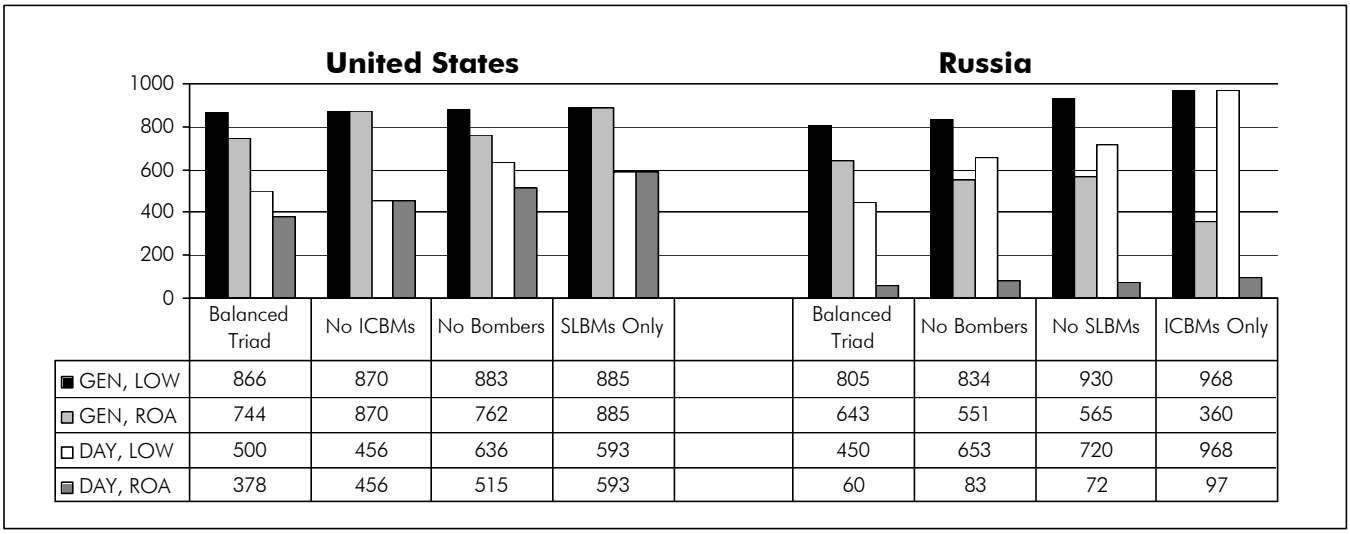
What remains to be discussed in the context of SORT forces is the introduction of defenses into the equation. There is the possibility of incorporating defenses with either high or low uncertainty about their likely performances, and with high or low controversy about their intended implications for stable deterrence between the United States and Russia. Putting it another way: People may object to defenses because they think they will not work well, or by contrast believe they will work too well. They might also object to missile defenses because their performance parameters are too uncertain. If defenses work tolerably well, they will force militaries to rethink the relationship between deterrence by punishment and that by denial. If they appear to be technical fiascoes, they will be attacked as defense welfare. If their performances cannot be reliably established by means of a rigorous testing program, then partisans of defenses and those opposing them will engage in a feeding frenzy over competing reams of data.

For purposes of this discussion, assume that a variety of missile defense technologies become available that permit each side to limit second strike damage to about one-half of what it would have been, absent defenses. We approximate this guideline by entering into our force exchange model an arbitrary performance parameter. The parameter decreases the expected probability of penetration for each retaliating warhead from ICBMs, SLBMs, and bomber-delivered weapons by 50 percent of its original (without defenses) value. We will play these hypothetical defenses against each of our offenses at 2,200 and 1,700 levels as defined above. The outcomes of these simulations for defenses against retaliating second strike forces are summarized in Figure 3 (for the 2,200 case) and Figure 4 (for the 1,700 limit).

The first result of this analysis is that defenses cannot by themselves remove either Russia or the United States from the condition of assured vulnerability based on offensive retaliation. Under any of the alternative offensive force structures, and assuming highly competent defenses by today's standards of technology, the societies of attacker and defender remain vulnerable to unacceptable destruction. Better defense might change this equation, but defenses more competent than this would almost certainly require boost-phase intercept technologies that were reliable and affordable. Even the United States, with its omnivorous defense budget and state-of-the art defense technology, is not there yet.

Second, compared to the reductions agreed to under START II and in negotiation under START III when superseded by SORT, SORT does impose significant limitations on targeting options in the event of war. Counterforce options, around which the U.S. and Russian nuclear war plans were built for most of the Cold War, will be fewer in number and more restricted in target coverage than they were in the past. This is true for both sides,

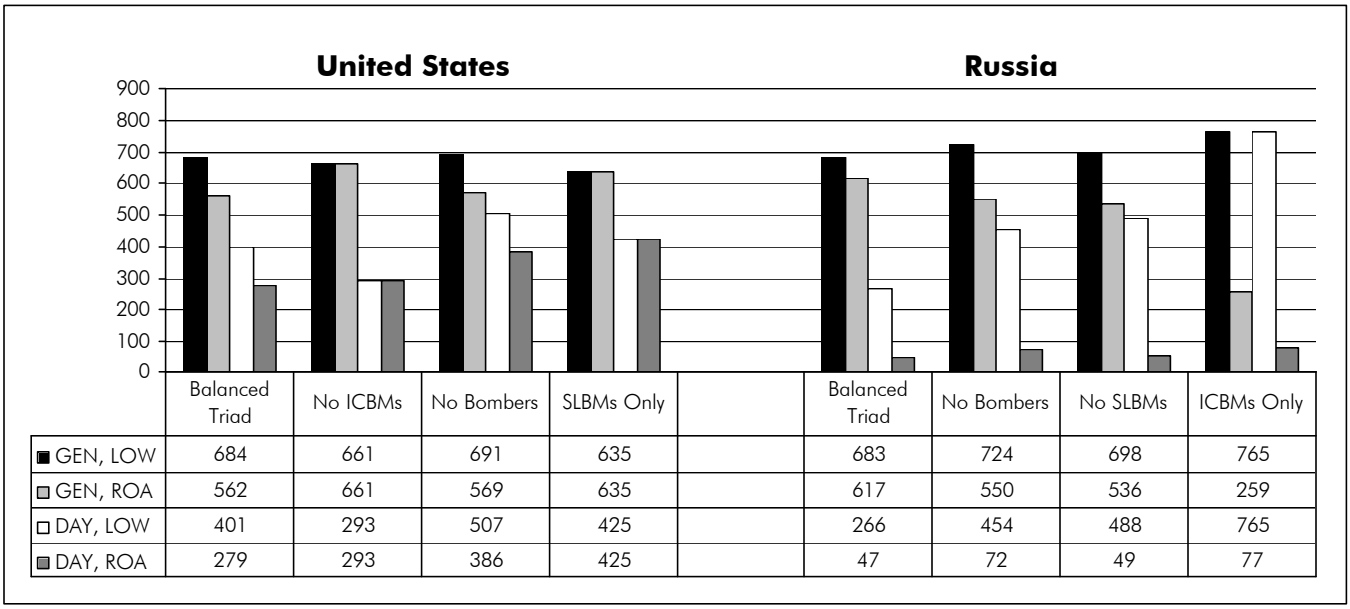
FIGURE 3
SURVIVING AND RETALIATING WARHEADS VS DEFENSES: 2,200 LIMIT



	Balanced Triad	No ICBMs	No Bombers	SLBMs Only		Balanced Triad	No Bombers	No SLBMs	ICBMs Only
GEN, LOW	866	870	883	885		805	834	930	968
GEN, ROA	744	870	762	885		643	551	565	360
DAY, LOW	500	456	636	593		450	653	720	968
DAY, ROA	378	456	515	593		60	83	72	97

Source: Author, based on a model developed by Dr. James Scouras, Strategy Research Group.

FIGURE 4
SURVIVING AND RETALIATING WARHEADS VS DEFENSES: 1,700 LIMIT



	Balanced Triad	No ICBMs	No Bombers	SLBMs Only		Balanced Triad	No Bombers	No SLBMs	ICBMs Only
GEN, LOW	684	661	691	635		683	724	698	765
GEN, ROA	562	661	569	635		617	550	536	259
DAY, LOW	401	293	507	425		266	454	488	765
DAY, ROA	279	293	386	425		47	72	49	77

Source: Author, based on a model developed by Dr. James Scouras, Strategy Research Group.

but even more for Russia, since its submarine and bomber forces are mere shadows of those once deployed by the Cold War Soviets. Some might argue with this contention by noting correctly that, as the numbers of deployed forces are reduced on both sides, each has correspondingly fewer counterforce targets at which to aim. This observation is a mathematical truism, but not necessarily a strategically correct assumption. For at issue is not only what targets are being attacked, but when and how.

Much of the analysis performed on hypothetical wars between the United States and the Soviet Union during the Cold War assumed a dominant and scripted scenario. In this scenario, each side would promptly attack the other's strategic nuclear forces with its most accurate missiles in order to limit damage to its own forces and society from enemy counterattacks. After the dust cleared from these initial (and massive) counterforce strikes, leaders would assess the situation and then order follow-up attacks based on the opponent's surviving military and conventional forces, command and communications systems, and other remaining assets. One reason that wars were choreographed in this fashion was that the United States and the Soviet Union had massive redundancy in their strategic nuclear forces. The numbers of warheads and the varieties of launchers deployed allowed for the plural targeting of many designated ground zeros. Long before even a small fraction of their total forces had been expended in such a war, the United States and the Soviet Union would have ceased to function as viable societies.

This disconnect between force size and strategic rationality was sufficiently large to call into question the wherewithal of leaders actually to comprehend the plans that would have dictated the scope and cost of a nuclear war. Few, if any, Cold War U.S. presidents or Soviet Politburo members were well informed about the details of the nuclear war plans that they would have been required to order into effect. Military staffs that did compile the war plans strained to find optimum targets for the growing numbers of warheads and launchers deployed from the mid-1960s through the 1980s. The intellectual demands on political leaders and their military advisors during a tense situation of nuclear crisis management, as in the Cuban missile crisis of 1962, were so omnivorous as to be psychologically disabling. Leaders in Washington or Moscow forced into a nuclear war would have been contemplating their own national suicide regardless of the military outcome.

Reductions to the force levels agreed under SORT will begin the process of removing the United States, Russia, and other states from living under the nuclear sword of Damocles that paralyzed strategic thinking and helped to defer U.S.-Russian political cooperation for much of the 1990s. As well, the deployment of antimissile defenses, combined with drastic offensive force reductions, lessens the likelihood of a nuclear missile surprise attack—especially one resulting from accidental launches— and limits the consequences of such an attack should it occur. But the issue of numbers or force postures is less important than the character of the political relations between America and Russia. Favorable developments in arms control follow improvements in political relations, as the START and SORT outcomes demonstrate.

CONCLUSIONS

The SORT treaty, combined with improved U.S.-Russian political relations after 9/11 and the possibility of jointly agreed defense deployments, amounts to a major change in the context of U.S.-Russian nuclear arms reductions. However, this changed context is not guaranteed to continue in perpetuity. It is based on several factors, including: (1) continued favorable political winds blowing between Washington and Moscow, even after George W. Bush and Vladimir Putin have departed from office; (2) real military reform in Russia, including a restructuring of Russia's national security apparatus to make the General Staff and other brass hats more accountable to civilian authority; (3) prioritization by the U.S. and Russian governments of those security related agenda items on which they share a community of interest: nonproliferation; terrorism; and further Russian economic integration with the European Union. In addition, the United States should not go off half cocked in its push for deployable missile defenses, leaving behind Russia and others in flippant defiance. The U.S. has no monopoly on scientific research and development related to security, and no lead in technology outlasts the ingenuity of the next generation of inventors.

The future of nuclear deterrence will be embedded in a complex security environment that includes: (1) U.S. and Russian deployed strategic nuclear weapons in numbers well below Cold War and immediate post-Cold War levels, (2) pressures for additional legitimate states and putative rogues to acquire nuclear weapons and ballistic missile delivery systems, and (3) theater and national missile defenses of uncertain effectiveness, but nonetheless deployed on account of political pressures, technology

creep, or strategic decision for which offenses alone can no longer provide deterrence. No one can say at this writing exactly where the offense-defense relationship is going, given the uncertainties inherent in this emerging international system. Nuclear deterrence is thought to be at risk in such a system, and defenses (along with preemption) are recommended by the Bush administration and others as necessary means to forestall nuclear adventurism.[11] But until new technology matures, assured retaliation—and therefore deterrence—remains based on survivable forces capable of inflicting unacceptable damage: "Unacceptable" is of course culturally defined, but, like pornography, we know it when we see it. And we will know when it has disappeared, too.

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[1] The author gratefully acknowledges Dr. James Scouras, Strategy Research Group, for use of his nuclear exchange model in this study. He is not responsible for any of the data analysis, nor for arguments and conclusions.

[2] Lawrence Freedman, "Eliminators, Marginalists and the Politics of Disarmament," in John Baylis and Robert O'Neill, eds., *Alternative Nuclear Futures: The Role of Nuclear Weapons in the Post-Cold War World* (Oxford: Oxford University Press, 2000), pp. 56-69.

[3] Colin S. Gray, *The Second Nuclear Age* (Boulder, Colo.: Lynne Rienner Publishers, 1999), esp. pp. 88-93. Gray emphasizes that deterrence is never reliable, and argues that it may be especially at risk in foreseeable, but nonlinear, futures.

[4] For pertinent scenarios, see David E. Mosher, Lowell H. Schwartz, David R. Howell and Lynn Davis, *Beyond the Nuclear Shadow: A Phased Approach for Improving Nuclear Safety and U.S.-Russian Relations* (Santa Monica, Calif.: RAND, 2003), esp. pp. 13-33.

[5] Pavel Podvig, et. al., eds., *Russian Strategic Nuclear Forces* (Cambridge, MA.: The MIT Press, 2001), p. 28.

[6] Center for Defense Information, "Likely Nuclear Arsenals Under the Strategic Offensive Reductions Treaty (Moscow Treaty)," January 21, 2003, <http:www.cdi.org/issues/nukef&f/database/startab.html>.

[7] Podvig, et. al., *Russian Strategic Nuclear Forces*, pp. 28-29.

[8] Center for Defense Information, "Likely Nuclear Arsenals."

[9] Alex Belida, "US Untroubled by Russia's Plans to Develop Missile Defense Shield," Voice of America, January 15, 2003; Johnson's Russia List, No. 7020, January 16, 2003.

[10] Paul Bracken, *Fire in the East: The Rise of Asian Military Power and the Second Nuclear Age* (New York: Harper Perennial, 1999), esp. pp. 95-124.

[11] Keith B. Payne, *The Fallacies of Cold War Deterrence and a New Direction* (Lexington, KY: University Press of Kentucky, 2001), pp. 39-77.

Appendix 1
Forces in the Analysis: 2,200 Warheads

U.S. Force 1	**Balanced Triad**			
Platform Name	**Total Platforms**	**Warheads per SNDV**	**Total SNDVs**	**Total Warheads**
MM III MK21	300	1	300	300
Total ICBM	300		300	300
Trident II	14	4	336	1,344
Total SLBM	14		336	1,344
B-52H	44	8	44	352
B2	20	8	20	160
Total Air	64		64	512
Grand Total	378		700	2,156

U.S. Force 2	**No ICBMs**			
Platform Name	**Total Platforms**	**Warheads per**	**Total SNDVs**	**Total Warheads**
MM III MK21	0	1	0	0
Total ICBM	0		0	0
Trident II	14	5	336	1680
Total SLBM	14		336	1680
B-52H	60	6	60	360
B2	20	8	20	160
Total Air	80		80	520
Grand Total	94		416	2,200

U.S. Force 3	**No Bombers**			
Platform Name	**Total Platforms**	**Warheads per SNDV**	**Total SNDVs**	**Total Warheads**
MM III MK21	300	1	300	300
Total ICBM	300		300	300
Trident II Atlantic	7	5	168	840
Trident II Pacific	7	6	168	1,008
Total SLBM	14		336	1,848
B-52H	0	8	0	0
B2	0	8	0	0
Total Air	0		0	0
Grand Total	314		636	2,148

U.S. Force 4	**SLBMs Only**			
Platform Name	**Total Platforms**	**Warheads per SNDV**	**Total SNDVs**	**Total Warheads**
MM III MK21	0	1	0	0
Total ICBM	0		0	0
Trident II Atlantic	7	7	168	1,176
Trident II Pacific	7	6	168	1,008
Total SLBM	14		336	2,184
B-52H	0	4	0	0
B2	0	8	0	0
Total Air	0		0	0
Grand Total	14		336	2,184

APPENDIX 1 (CONTINUED)
FORCES IN THE ANALYSIS: 2,200 WARHEADS

Russian Federation Force 1	**Balanced Triad**			
Platform Name	**Total Platforms**	**Warheads per SNDV**	**Total SNDVs**	**Total Warheads**
SS-19 (upgrade)	150	1	150	150
SS-25	270	1	270	270
SS-27 mobile	250	1	250	250
SS-27 silo	250	1	250	250
Total ICBM	920		920	920
Delta IV	7	4	112	448
Yuri Dolgorukiy	3	4	48	192
Total SLBM	10		160	640
Bear H	66	6	66	396
Blackjack	15	12	15	180
Total Air	81		81	576
Grand Total	1,011		1,161	2,136

Russian Federation Force 2	**No Bombers**			
Platform Name	**Total Platforms**	**Warheads per SNDV**	**Total SNDVs**	**Total Warheads**
SS-19 (upgrade)	150	3	150	450
SS-25	350	1	350	350
SS-27 mobile	300	1	300	300
SS-27 silo	250	1	250	250
Total ICBM	1,050		1,050	1,350
Delta IV	7	5	112	560
Yuri Dolgorukiy	3	5	48	240
Total SLBM	10		160	800
Bear H	0	6	0	0
Blackjack	0	12	0	0
Total Air	0		0	0
Grand Total	1,060		1,210	2,150

Russian Federation Force 3	**No SLBMs**			
Platform Name	**Total Platforms**	**Warheads per SNDV**	**Total SNDVs**	**Total Warheads**
SS-19 (upgrade)	150	4	150	600
SS-25	350	1	350	350
SS-27 mobile	350	1	350	350
SS-27 silo	300	1	300	300
Total ICBM	1,150		1,150	1,600
Delta IV	0	4	0	0
Total SLBM	0		0	0
Bear H	66	6	66	396
Blackjack	15	12	15	180
Total Air	81		81	576
Grand Total	1,231		1,231	2,176

Appendix 1 (Continued)
Forces in the Analysis: 2,200 Warheads

Russian Federation Force 4	ICBMs Only			
Platform Name	**Total Platforms**	**Warheads per SNDV**	**Total SNDVs**	**Total Warheads**
SS-19 (upgraded)	300	4	300	1,200
SS-25	350	1	350	350
SS-27 mobile	300	1	300	300
SS-27 silo	300	1	300	300
SS-24 mobile	0	1	0	0
Total ICBM	1,250		1,250	2,150
Delta IV	0	4	0	0
Total SLBM	0		0	0
Bear H	0	6	0	0
Blackjack	0	12	0	0
Total Air	0		0	0

APPENDIX 2
FORCES IN THE ANALYSIS: 1,700 FORCES

U.S. Force 1	Balanced Triad			
Platform Name	**Total Platforms**	**Warheads per SNDV**	**Total SNDVs**	**Total Warheads**
MM III MK21	300	1	300	300
Total ICBM	300		300	300
Trident II	14	5	196	980
Total SLBM	14		196	980
B-52H	64	4	64	256
B2	20	8	20	160
Total Air	84		84	416
Grand Total	398		580	1,696

U.S. Force 2	No ICBMs			
Platform Name	**Total Platforms**	**Warheads per SNDV**	**Total SNDVs**	**Total Warheads**
MM III MK21	0	1	0	0
Total ICBM	0		0	0
Trident II Atlantic	7	6	98	588
Trident II Pacific	7	5	98	490
Total SLBM	14		196	1078
B-52H	57	8	57	456
B2	20	8	20	160
Total Air	77		77	616

U.S. Force 3	No Bombers			
Platform Name	**Total Platforms**	**Warheads per SNDV**	**Total SNDVs**	**Total Warheads**
MM III MK21	300	1	300	300
Total ICBM	300		300	300
Trident II	14	7	196	1,372
Total SLBM	14		196	1,372
B-52H	0	8	0	0
B2	0	8	0	0
Total Air	0		0	0
Grand Total	314		496	1,672

U.S. Force 4	SLBMs Only			
Platform Name	**Total Platforms**	**Warheads per SNDV**	**Total SNDVs**	**Total Warheads**
MM III MK21	0	1	0	0
Total ICBM	0		0	0
Trident II Atlantic	7	8	98	784
Trident II Pacific	7	8	98	784
Total SLBM	14		196	1,568
B-52H	0	4	0	0
B2	0	8	0	0
Total Air	0		0	0
Grand Total	14		196	1,568

Appendix 2 (Continued)
Forces in the Analysis: 1,700 Forces

Russian Federation Force 1	**Balanced Triad**			
Platform Name	**Total Platforms**	**Warheads per SNDV**	**Total SNDVs**	**Total Warheads**
SS-19	105	1	105	105
SS-25	251	1	251	251
SS-27 mobile	60	1	60	60
SS-27 silo	60	1	60	60
Total ICBM	476		476	476
Delta IV	7	4	112	448
Dolgorukiy class	3	4	48	192
Total SLBM	10		160	640
Bear H	66	6	66	396
Blackjack	15	12	15	180
Total Air	81		81	576
Grand Total	567		717	1,692

Russian Federation Force 2	**No Bombers**			
Platform Name	**Total Platforms**	**Warheads per SNDV**	**Total SNDVs**	**Total Warheads**
SS-19	0	1	0	0
SS-25	0	1	0	0
SS-27 mobile	430	1	430	430
SS-27 silo	430	1	430	430
Total ICBM	860		860	860
Delta IV	10	4	160	640
Dolgorukiy class	3	4	48	192
Total SLBM	13		208	832
Bear H	0	6	0	0
Blackjack	0	12	0	0
Total Air	0		0	0
Grand Total	873		1,068	1,692

Russian Federation Force 3	**No SLBMs**			
Platform Name	**Total Platforms**	**Warheads per SNDV**	**Total SNDVs**	**Total Warheads**
SS-19	0	1	0	0
SS-25	225	1	225	225
SS-27 mobile	460	1	460	460
SS-27 silo	400	1	400	400
Total ICBM	1,085		1,085	1,085
Delta IV	0	4	0	0
Total SLBM	0		0	0
Bear H	66	6	66	396
Blackjack	15	12	15	180
Total Air	81		81	576
Grand Total	1,166		1,166	1,661

APPENDIX 2 (CONTINUED)
FORCES IN THE ANALYSIS: 1,700 FORCES

Russian Federation Force 4	**ICBMs Only**			
Platform Name	**Total Platforms**	**Warheads per SNDV**	**Total SNDVs**	**Total Warheads**
SS-19	150	6	150	900
SS-25	200	1	200	200
SS-27 mobile	250	1	250	250
SS-27 silo	350	1	350	350
Total ICBM	950		950	1,700
Delta IV	0	4	0	0
Total SLBM	0		0	0
Bear H	0	6	0	0
Blackjack	0	12	0	0
Total Air	0		0	0
Grand Total	950		950	1,700