

# Smaller and Safer

## A New Plan For Nuclear Postures

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On April 8, sitting beside each other in Prague Castle, U.S. President Barack Obama and Russian President Dmitry Medvedev signed the New Strategic Arms Reduction Treaty (New START). Just two days earlier, the Obama administration had issued its Nuclear Posture Review, only the third such comprehensive assessment of the United States' nuclear strategy. And in May, as a gesture of openness at the Nuclear Nonproliferation Treaty Review Conference in New York, the U.S. government took the remarkable step of making public the size of its nuclear stockpile, which as of September 2009 totaled 5,113 warheads.

For proponents of eliminating nuclear weapons, these events elicited both a nod and a sigh. On the one hand, they repre-

sented renewed engagement by Washington and Moscow on arms control, a step toward, as the treaty put it, "the historic goal of freeing humanity from the nuclear threat." On the other hand, they stopped short of fundamentally changing the Cold War face of deterrence.

The New START agreement did not reduce the amount of "overkill" in either country's arsenal. Nor did it alter another important characteristic of the U.S. and Russian nuclear arsenals: their launch-ready alert postures. The two countries' nuclear command, control, and communication systems, and sizable portions of their weapon systems, will still be poised for "launch on warning"—ready to execute a mass firing of missiles before the quickest

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of potential enemy attacks could be carried out. This rapid-fire posture carries with it the risk of a launch in response to a false alarm resulting from human or technical error or even a malicious, unauthorized launch. Thus, under the New START treaty, the United States and Russia remain ready to inflict apocalyptic devastation in a nuclear exchange that would cause millions of casualties and wreak unfathomable environmental ruin.

In the next round of arms control negotiations, Washington and Moscow need to pursue much deeper cuts in their nuclear stockpiles and agree to a lower level of launch readiness. These steps would help put the world on a path to the elimination of nuclear weapons—“global zero.” And they can be taken while still maintaining a stable relationship of mutual deterrence between the United States and Russia, based on a credible threat of retaliation, and while allowing limited but adequate missile defenses against nuclear proliferators such as Iran and North Korea.

#### **WAR GAMES**

A stable nuclear deterrent exists between the United States and Russia when neither country would choose to launch a nuclear attack against the other regardless of the level of tension that may arise between them. Deterrence would become unstable if either country acquired a credible first-strike capability—the ability to attack without fear of reprisal. The stability of deterrence, then, comes down to an assessment of the viability of both sides’ retaliatory capacities.

Such a metric of stability was applied by nuclear planners in coming up with warhead limits for the New START treaty. After calculating the damage from a first strike against nuclear forces, they determined how many surviving nuclear weapons could be used in a retaliatory attack against targets of value—economic and administrative centers. The planners assumed that in order for deterrence to be stable and predictable, a country had to be able to retaliate against 150 to 300 urban targets. These judgments played a key role in setting the warhead limit of 1,550 for each side in the New START treaty.

Many planners still contend that deterrence also requires the ability to retaliate against an opponent’s leadership bunkers and nuclear installations, even empty missile silos. But this Cold War doctrine is out of date. Deterrence today would remain stable even if retaliation against only ten cities were assured. Furthermore, uncertainty and incomplete knowledge would make U.S. and Russian policymakers risk averse in a crisis rather than risk tolerant. So arsenals can safely be reduced much further than the New START level. But just how deeply can they be cut? And how can the reliance on a quick launch be eliminated while preserving strategic stability? To answer these questions, we created computer models that pitted U.S. and Russian strategic offensive forces against each other in simulated nuclear exchanges. We also modeled the thorny problem of missile defense systems to assess their impact on the stability of deterrence and to gauge at what warhead levels they become destabilizing.<sup>1</sup>

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<sup>1</sup>The technical details of the analysis presented in this essay are available online at [www.globalzero.org/files/FA\\_appendix.pdf](http://www.globalzero.org/files/FA_appendix.pdf).

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We used public estimates of U.S. and Russian nuclear forces—their number, accuracy, explosive yields, reliability, vulnerability—and manipulated their launch readiness to test the effects of de-alerting on their ability to survive a first strike and be available for retaliation against urban centers. Because some range of uncertainty is associated with each variable, we ran the model simulation at least 100 times for each possible set of characteristics.

Our modeling found that the United States and Russia could limit their strategic nuclear arsenals to a total level of 1,000 warheads each on no more than 500 deployed launchers without weakening their respective security. De-alerting these forces actually helped stabilize deterrence at these and lower levels. And the modeling showed that fairly extensive missile defense deployments would not upset this stability.

Dropping to 1,000 total warheads is the low-hanging fruit when it comes to arms control. To make further progress toward a nuclear-free world, it will be necessary to pursue even deeper cuts. These will depend on the state of relations between the United States and Russia, on the worldwide deployment of missile defense systems, on the precision of long-range weapons, and on the prospects of involving other nuclear states in the process of reducing and limiting nuclear weapons. It is hard to imagine, for example, that the United States and Russia would go below 1,000 total nuclear weapons if China was increasing its nuclear capacity.

The next stage in arms control negotiations should cover all the complex issues of nuclear weapons, including those sur-

rounding both strategic and substrategic (tactical) nuclear weapons, as well as limits on strategic offensive weapons with conventional warheads. A realistic goal would be for the United States and Russia to agree to each have no more than a total of 1,000 strategic and tactical nuclear warheads combined. Taking into account the fact that for Russia tactical nuclear weaponry is a sensitive problem (primarily because of the superiority of China's conventional forces), this treaty should allow each side flexibility in determining its warhead mix. For example, Russia might retain 700 strategic warheads and 300 tactical warheads, whereas the United States might retain 900 strategic and 100 tactical weapons.

Because the delivery vehicles, or launchers, for tactical nuclear weapons can also carry conventional weapons, the treaty should place limits not on tactical launchers but on tactical warheads. It will be essential that all the tactical weapons in storage be inspected regularly to verify that the treaty's provisions have been implemented. Strategic nuclear warheads should ideally be kept separate from tactical ones. Since Russia currently stores these warheads together, the treaty should designate one or two monitored storage locations for tactical weapons on each side.

Further strides toward nuclear disarmament will be possible only if the other nuclear powers freeze their arsenals and join in the negotiation process to reduce their forces proportionately. For this stage, the United States and Russia could cut their arsenals to 500 nuclear warheads each in exchange for 50 percent reductions by the other nuclear weapons countries.

**TOO READY**

For almost half a century, about one-third of the United States' and Russia's strategic nuclear arsenals have been maintained on launch-ready alert. A massive salvo can commence just a few minutes after the combat order is received by the crews on duty. This posture has proved difficult to wind down, even though such high readiness comes with many dangerous risks.

Given the recent surge of terrorism and nuclear proliferation, the liabilities of maintaining such quick-launch postures are only increasing. In the future, the danger of mistaken or unauthorized use or of the exploitation of nuclear weapons by terrorists is likely to grow rather than diminish. War-ready nuclear postures keep hundreds of nuclear weapons in constant motion, changing combat positions or moving to and from maintenance facilities. This affords terrorists opportunities to steal them as they are transported and stored temporarily—the relatively exposed phase of their operation.

These postures also perpetuate a mutual reliance on nuclear weapons that lends legitimacy to the nuclear ambitions of other nations. When more states go nuclear, intentional use becomes more likely, and deficiencies in nuclear command and warning systems multiply the risk of accidental or unauthorized use or terrorist theft.

Given these dangers, going off launch-ready alert would yield major benefits—including opening up possibilities for still greater reductions in the size of arsenals. Although de-alerting was not on the table during the negotiations for the New START treaty, it should have been. The requirements of mutual deterrence between the

United States and Russia are far less demanding today than they were two decades ago, even as the challenges of preventing proliferation and nuclear terrorism have grown.

To ensure stable deterrence with forces that are smaller and off alert, the nuclear forces of both countries should be divided into distinct components, each with a different degree of combat readiness. A stable deterrent whole would thus be constructed from more vulnerable, de-alerted parts. To demonstrate the stability of deterrence under such a setup, we again used simulations of nuclear exchanges. The latest U.S. Nuclear Posture Review concluded that de-alerting “could reduce crisis stability by giving an adversary the incentive to attack before ‘re-alerting’ was complete.” We found, in contrast, that de-alerting does not create incentives for re-alerting and launching a preemptive attack during a crisis. In fact, done properly, de-alerting stabilizes deterrence.

In our model, the primary group of de-alerted nuclear forces for each country is the “first echelon.” It consists of equal numbers of U.S. and Russian high-yield, single-warhead, silo-based intercontinental ballistic missiles (ICBMs). These first-echelon ICBMs can be brought to launch-ready status in a matter of hours—for example, maintenance crews would reenter missile silos to activate the launch circuits. Their primary role is that of peacetime nuclear deterrence for the United States and Russia, the day-to-day frontline of deterrence.

The “second echelon” of de-alerted nuclear forces consists of a more diverse set of nuclear weapons, with equal numbers of warheads on each side but with asymmetry in the types of weapons. It

includes both multiple-warhead and single-warhead weapons: submarine-launched ballistic missiles, silo-based ICBMs, and road-mobile ICBMs. In their day-to-day, off-alert status, second-echelon forces are quite vulnerable. But they are highly survivable when they are re-alerted and dispersed—submarines surge to sea, for example, and road-mobile missiles dash into Siberian forests. These second-echelon forces take much longer to re-alert—weeks to months—than first-echelon forces. Warheads, for instance, might have to be removed from storage and mounted on missile launchers. But our results show that no advantage could be gained by any re-alerting of either first- or second-echelon forces. Deterrence is robustly reinforced by the lack of incentives to re-alert.

We looked at scenarios involving an attacking state and a victim state in which the attacking state secretly re-alerts its first-echelon forces and strikes the first echelon of the victim state—a so-called counterforce attack meant to disarm the adversary and gain a strategic advantage. In these scenarios, the attacker expends more warheads than it can destroy and must assume that the victim will respond by firing its surviving first-echelon forces at the cities of the aggressor. If the attacker used some of its first-echelon missiles to strike the victim's second-echelon forces, then the aggressor would expose additional cities to retaliation by the victim's first-echelon forces.

In our model, after the initial attack, both sides would re-alert their second-echelon forces (for example, deploying submarines to sea), and the second echelon of the attacking state would strike the second-echelon forces of the victim as

they were being readied for use. Our model allowed for some random variability in the pace of re-alerting by both side's second echelons in a nuclear war. What was left of the victim's second-echelon forces could then conduct further strikes against cities of the attacker. This scenario is the way to test whether deterrence is stable when forces are off alert. If the victim has enough residual capability to deter an attacker contemplating a "bolt from the blue," then deterrence is stable.

If the United States' and Russia's nuclear arsenals were each limited to 1,000 (or even 500) warheads, and if their forces were de-alerted and partitioned into first and second echelons, an aggressor would still face the possibility of unthinkable devastation wrought by retaliation against more than 100 cities. That should easily be enough to deter any such attack, assuming the potential aggressor is rational enough to respond to the logic of deterrence in the first place.

#### **PARTNERS IN DEFENSE**

Missile defense, a divisive topic during the lengthy back-and-forth over the terms of the New START agreement, threatens to derail the next phase of negotiations. In September 2009, the Obama administration shelved plans for missile defense radars and other missile defense infrastructure in the Czech Republic and Poland. Russia welcomed this move. But the new U.S. posture keeps open the question of the U.S. missile defense system's capability against Russian strategic nuclear forces.

When antiballistic missile (ABM) systems are small enough, they do not distract from the arms reduction process. Russia, for example, is comfortable with having regional ABM systems near its borders that

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are designed to shoot down short- and medium-range missiles, and it sees merit in joining with other states in creating a cooperative regional system. It is especially keen on regional defenses because its nuclear-armed neighbors—China, India, and Pakistan—are not subject to the ban on nonstrategic missiles stipulated by the U.S.-Russian Intermediate-Range Nuclear Forces Treaty. These neighbors have been deploying nonstrategic missiles, and still other countries (such as Iran and North Korea) are likely seeking them.

Russia was therefore disappointed by Washington's plans to create piecemeal regional ABM systems—partnering with Israel in the Middle East, with Japan in the Asia-Pacific region, and with NATO members in Europe—without consulting Moscow. Although the Obama team has suggested using Russian radar stations in the Azerbaijani city of Gabala and the Russian city of Armavir in a regional ABM system, the United States has shown little real interest in cooperating with Russia in such an endeavor. In Russia's eyes, the United States is intending to create not a true European system—including Russia as part of Europe—but a NATO system instead.

This noninclusive approach might lead to a new crisis in U.S.-Russian and NATO-Russian relations in a decade or so, when the United States' and NATO's new missile defense systems will likely be able to destroy significant numbers of Russia's strategic missiles. If this capacity is constrained in ways that reassure Russia that its nuclear deterrent will remain viable, then the process of nuclear weapons reductions will remain on track. But if Russia is not reassured, the New START agreement could become the end of

nuclear weapons reductions rather than a step toward further ones.

That is why strategic missile defenses have to be kept from reaching a point where they can prevent retaliation by knocking out strategic offensive missiles. The results of our modeling for the 1,000-warhead level suggest that advanced missile defense systems, such as the SM-3 Block 2 that the U.S. Navy is testing, would not upset deterrence stability if their numbers do not exceed 100 interceptors deployed by each side. An attacking country could not expect to protect itself from retaliation against its cities if it possessed only 100 or fewer such interceptors. Under current plans, the United States will deploy fewer than 100 interceptors. Russia will strongly oppose expansion above this level.

Even more important than such limits will be U.S.-Russian cooperation on the missile defense problem—namely, an agreement to share control of missile defense systems. This arrangement should go beyond bilateral control to a broader European arrangement that at minimum should entail NATO-Russia cooperation. A cooperative system like this would not be a dual-key system that would give Russia or any other country a veto over missile defense operations and thus over other countries' security. Cooperation could, and ideally would, involve only the joint detection, identification, and countering of emerging missile threats.

The same logic applies to national and regional ABM systems, given the widespread geographic impact of missile defenses. For example, ABM operations in the Asia-Pacific region might result in interception and explosions above other states' territories or in potentially radioactive debris falling

onto another state's territory. Failing to coordinate national responses in such circumstances could lead to disaster.

In 2008, Russia proposed developing a joint database of missile attack threats, sought to create a common control body for the early warning and estimation of missile threats, and said it would be willing to engage in joint planning on a future regional missile defense system. There are small but significant steps toward that end that are worth taking: the United States and Russia could exchange military attachés, observe missile defense tests together, and establish a joint center for monitoring missile launches worldwide.

unauthorized or mistaken launches and about estimates of first- and second-strike attacks hamper informed public debate and instill mutual suspicion. Open analysis can help inform the public and policymakers on the best way forward for nuclear policy, elevating the debate above the fray of politics, ideology, and secrecy to a higher plane of objective and transparent analysis. This openness could pave the way toward a safer and more stable world with fewer, and eventually zero, nuclear weapons. 🌍

#### **DESTINATION: ZERO**

Once the New START agreement is approved by the U.S. Senate, the arms control process between the United States and Russia needs to continue moving forward. Washington and Moscow could easily reduce their nuclear forces to just 1,000 warheads apiece without any adverse consequences. They could also de-alert their nuclear forces, diminishing the risk of an accidental or unauthorized launch. Eventually, in concert with other nuclear states and after progress has been made on missile defense cooperation, they should be able to reduce their arsenals to 500 weapons each. Even after these deep cuts, hundreds of cities would still remain at risk of catastrophic destruction in the event of a nuclear war.

Such changes to the nuclear relationship between the United States and Russia should be accompanied by a change in attitude as well as forces: both countries must be more open in assessing nuclear threats and the requirements of deterrence. Secrecy about safeguards against