

## Arms Control After the Collapse of the Soviet Union

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Perhaps the most difficult thing I do is explain what I do for a living. I usually describe myself as a physicist, because I was trained as one, and because I think about problems like a physicist. But the physics I do today, although I find it intellectually stimulating, isn't anywhere near the cutting edge, and so I don't describe myself as a physicist to other physicists.

I was horrified to have a physicist introduce me to a group a few months ago as a "political scientist"--I'm sure you'll agree that that's even worse than being mistaken for an engineer. Every week or so I still have nightmares about that talk.

The last few years have been interesting for all of us, but especially for me. For the past five years I have been working with the Frank von Hippel and the Federation of American Scientists on cooperative arms control measures with a group of Soviet--and now Russian--scientists, including Roald Sagdeev, who, as you know, is now on the faculty here (although I think I saw more of him when he lived in Moscow).

People often ask me how I got mixed up in the arms control and security policy business. I got my PhD working in magnetic fusion energy, but in the early 1980s that didn't look like a very promising field. Arms control, on the other hand, was clearly a growth stock.

Now, of course, it looks just the opposite, as fusion nears break-even and our most implacable adversary, the Soviet Union, disintegrates. Foundation support for security studies is drying up, and many security analysts are busy looking for a new line of work.

I think this is unfortunate. For forty years, the world was a terribly hostile and rigid place. Now there is an opportunity to make lasting changes, but Americans are losing interest. Our collective attention span is disturbingly short. For example, the Presidential primary debate so far has containing few if any references to arms control or aid to the Soviet Union.

I think that there is an important role for arms control after the collapse of the Soviet Union, and that role is in helping to establish a stable and durable peace, stable in the short term as well as in the long term. I can think of at least three areas in which arms control can help:

(1) in strengthening the centralized command and control over nuclear weapons (especially Russian weapons) to guard against the possibility of unauthorized use, and in strengthening civilian control in general;

(2) in moving toward much smaller nuclear arsenals that preserve a stable deterrent without indulging dangerous war-fighting fantasies; and

(3) in slowing the spread of nuclear and other weapons of mass destruction.

Strengthening command and control and slowing the spread of nuclear weapons are fairly straightforward, self-explanatory, and generally accepted goals. But it isn't so obvious to some people why we should want much smaller nuclear arsenals, so I will say a bit about this.

A recent report prepared by the Bush administration--the so-called "Reed Report"--finds that a sizable nuclear arsenal--no less than 5,000 warheads--would be useful to guard against uncertainties in the former Soviet Union, to keep countries like Iraq in their place, and, through bizarre reasoning, to pursue "moral" targeting plans--that is, blowing up numerous nuclear facilities rather than cities. But on every count these analysts are wrong:

The best way to guard against uncertainty in the former Soviet Union is to use the current atmosphere of cooperation to reduce forces to the minimum required for deterrence. Whatever the future of the former Soviet Union, from complete chaos to a military takeover--and I believe that both of these extremes are real possibilities--we are best off if they have fewer weapons. The price we must pay for this is reducing our own arsenal, but this is a price well worth paying. It is foolhardy to believe that a huge nuclear arsenal can somehow protect us. Nuclear weapons are only useful to deter an attack, and for this only a few hundred warheads at most are needed--not several thousand.

The idea that a large nuclear arsenal is useful against third powers is even more bizarre. In fact, just the opposite seems to be the case: that large arsenals impair our ability to slow the spread of nuclear weapons. The lesson of the Gulf War, according to an Indian ambassador, is "never fight the United States without nuclear weapons." I wonder: is this the lesson we wanted to teach the world?

Large arsenals impair our moral authority in dealing with proliferation, they justify the continuing modernization of British, French, and Chinese arsenals, and justify the continuing intransigence of India, Pakistan, Israel, and North Korea in opening up their nuclear facilities for inspection, and they violate our pledge in Article VI of the Non-Proliferation Treaty to pursue negotiations in good faith to end the arms race and to pursue nuclear disarmament.

Finally, small arsenals will force us to abandon the dangerous and destabilizing strategy of damage limitation by targeting the adversary's nuclear forces. Maintaining forces that are capable of destroying the other side's forces only increases the premium for going first in a crisis. This strategy didn't make any sense when we were enemies, and it certainly doesn't make sense today.

It is also worth mentioning that massive reductions in nuclear arms will save billions of dollars, and eventually tens of billions of dollars, per year--not an negligible factor in the budget environment of the 1990s.

The huge nuclear arsenals amassed by the superpowers were the most visible and potent symbols of the Cold War. It is only appropriate that huge reductions in these arsenals will be one of the most visible measures of progress toward a lasting peace.

Unfortunately, two obstacles stand in the way of using arms control to achieve deep reductions and slow proliferation.

The first is the pervasive idea that we have "solved" our problem with the Soviet Union: the Russians are our friends now, and arms control is pretty much irrelevant or obsolete--a relic of a by-gone era. I wish that this was true, but it is not. We have a very, very long way to go before we think of Russia in the same way as we think about Britain, for example.

The second obstacle is the widespread belief that we "won" the Cold War, and to the victor belong the spoils. This is the attitude of conservatives in and out of the administration, who feel that we can ignore Russia's claim for equal treatment, and, as the world's only remaining superpower, simply dictate our terms to the rest of the world. You can find this view expounded upon in the Washington Post by Charles Krauthammer.

Now let me give you several examples of how these attitudes interfere with using arms control to achieve a stable peace.

First, both attitudes stand in the way of deep reductions in superpower arsenals--in the verification of such cuts and in financial support for cuts. START will undoubtedly be ratified soon, as it should be, and there is much to applaud in the unilateral reductions in nuclear arms that were announced by Bush in September and by Gorbachev in October.

Unfortunately, Russia will have a hard time implementing these reductions for financial reasons, and the United States has been slow to offer assistance. In the fall, Les Aspin and Sam Nunn cosponsored legislation to transfer \$1 billion from the \$291-billion defense budget to aid Russia and other republics in military conversion, only to see their coalition fall apart over charges that, in the midst of a recession, we should be helping our own people, not the Russians. The administration also opposed the measure. To think that we spent over \$4 trillion dollars on defense during the Cold War, but would not be willing to spend \$1 billion to help dismantle this doomsday machine is mind-boogling.

Then, the FAS invited the deputy minister of Atomic Power and Industry, Victor Michailov, who oversees the Russian nuclear weapons complex, to come to the United States. In meetings with congressmen, Michailov pleaded for U.S. assistance in dismantling Russian nuclear weapons. To its credit, Congress quickly passed the Nunn-Lugar amendment, which authorized the president to spend \$400 million to assist Russia and other republics in dismantling weapons. The administration was absolutely silent during the congressional debate. Only in December did the administration indicate that it would spend the money authorized by Congress, and only yesterday did it announce plans for how to spend it.

\$400 million may seem like a lot of money, but it is only a small fraction of what is required to destroy the thousands of missiles and warheads called for by START and the agreed unilateral reductions. In fact, I would suggest simply paying Russia a flat fee--e.g., \$1 million--for every warhead whose destruction we verify. Destroying all 30,000 Russian warheads at \$1 million each would cost \$30 billion dollars. This may seem like a huge amount of money, but it is equal to what we spend each year on our strategic nuclear forces, and it's roughly equal to the amount

that has already been spent on SDI research--a program whose goal is to render nuclear weapons obsolete.

The START Treaty, which will reduce strategic arsenals by 30 to 40 percent, contains elaborate verification provisions, but the unilateral reductions subsequently announced by Bush and Gorbachev contained none. It was felt, quite properly, that reciprocal unilateral reductions would proceed much faster than official negotiations, but that doesn't mean that unilateral reductions shouldn't be verified.

This is a sore spot with Russia, since receiving the \$400 million in aid requires verification of weapon destruction--Congress isn't going to hand over the money without making sure that we get something in return. Russia appears willing to submit to any reasonable verification procedure that we can dream up, but on a bilateral basis only. For example, I believe that Russia would be willing to allow U.S. inspectors to verify the destruction of Russian warheads, but only if Russian inspectors have similar rights for U.S. warheads.

The administration remains opposed to verifying the unilateral declarations for three reasons: (1) it would be excessively intrusive, and might reveal sensitive information and technology; (2) verification itself might produce problems, delaying the disarmament process and introducing disagreements over procedures and compliance issues; and (3) at current levels of armaments, verification seems unnecessary.

In the agreement announced yesterday between Yeltsin and Baker, the Congressional requirement for verification was papered over by agreeing to spend the money largely on a storage facility for plutonium. The U.S. will "verify" the dismantlement process merely by observing that plutonium is placed inside the facility--but not necessarily even the amount of plutonium placed inside.

But the administration is overlooking one very important point: if we are ever to reach very low levels of nuclear weapons, we must be very careful about how we go about implementing the current round of reductions.

In fact, if we are sloppy about documenting these reductions, we may introduce such large uncertainties in our knowledge of the other side's arsenal that we may be unable to go low. An uncertainty of  $\pm 500$  warheads may not be significant when both sides have 5,000 warheads, but it would be highly significant when we wish to reduce to only 500 per side.

In fact, the administration is cool to the whole idea of nuclear warhead, as opposed to nuclear delivery vehicle, arms control. For example, Gorbachev, and now Yeltsin, have proposed a ban on the production of uranium and plutonium for weapons, but the administration has not responded, in spite of the fact that we have not produced either material for years, in spite of the fact that we have enough of these materials to build 25,000 warheads, and in spite of the fact that we will be awash in these materials from dismantled warheads. The only reason given by the administration is that the United States must preserve its "flexibility."

Controls on delivery vehicles alone cannot support a deep-cuts regime, because the production of some delivery vehicles cannot be verified. For example, cruise missiles are produced and assembled in rather undistinctive buildings, and conventional cruise missiles will soon abound in any case. In order to build a stable regime we need to couple controls on delivery vehicles with restrictions on warheads and on research and development.

President Yeltsin has called on President Bush to reduce to a near-term level of 2,000 to 2,500 warheads on each side, on the way to even smaller arsenals. Russian officials have called for financial assistance to speed these reductions, coupled with mutual verification.

If we refuse to go low, to give aid, or to submit ourselves to the same procedures we would ask of Russia, we will only breed suspicion and resentment. This is not the basis for a stable peace. We should put aside parochialism and near-sighted budgetary analysis, and seize this historic opportunity to build trust and mutual respect.

Specifically, we should immediately declare a ban on the production of fissile materials (highly enriched uranium and plutonium), and we should work with Russia to verify current stockpiles of these materials as best as possible. We have to act soon, or this information will be lost forever as facilities are dismantled, key scientists die, and records are lost.

A ban on FM production could be made universal, and could apply to India, Pakistan, Israel, North Korea, and other countries that have not signed the NPT. A ban could be verified by IAEA-type safeguards on all nuclear facilities. Thus, a FM production ban would strengthen the NPT as well as complement it, by subjecting the nuclear weapon states to the same set of inspections as non-nuclear states--thus eliminating a double standard that has often been a sore spot in the NPT.

Next, nuclear warheads can be verifiably dismantled and the fissile materials placed under international safeguards for peaceful uses. Verified dismantlement will be tricky, but I am convinced that it can be done without revealing truly sensitive information.

As I mentioned above, we could "buy" the warheads or the fissile materials from Russia, and they could use the proceeds to speed the dismantlement process, to keep their nuclear scientists happily employed and their salaries high, or for the conversion of defense industries to civilian production.

For example, the 550 tons of highly enriched uranium contained in Russian nuclear weapons is worth about \$10 billion at current market prices. Buying up such materials will ensure that less is available for theft (if chaos breaks out), and will ensure the irreversibility of deep reductions (if hostile authorities take control).

Next, we should immediately end the testing of nuclear weapons, and sign comprehensive test ban treaty with Russia and all other willing parties. The Soviet Union has conducted only one test in the past two years, while the U.S. program has been limited only by the budget. Repeated calls by Gorbachev and now Yeltsin to end testing have been ignored by the Reagan and Bush administrations, and this can only engender resentment.

There is no good reason to continue testing--it is not needed to maintain the safety or reliability of the nuclear arsenal, as is sometimes maintained. [For more details...]

But there is good reason to end testing. The United States has been criticized at every 5-year review conference of the NPT for its failure to negotiate a test ban, and this issue caused the last review conference to end for the first time without a consensus document. The final NPT review conference occurs in 1995, at which time the fate of the treaty will be decided. A test ban may not be the crucial factor in getting this valuable treaty renewed, but it certainly can't hurt.

The attitude that the U.S. "won" the Cold War is most apparent is calls for the U.S. to pursue the Strategic Defense Initiative, or its more limited variation, GPALS (Global Protection Against Limited Strikes). This I believe is misguided for several reasons.

First, it will cause suspicion and resentment in Russia, because it will threaten their deterrent. They will think that we are trying to escape from the nuclear dilemma while leaving them subject to it--to make ourselves immune from nuclear attack, while leaving them subject to it.

You may have noted that Yeltsin, unlike Gorbachev, appears to support defenses, but if you read his statement closely you will see that he only supports a system that is jointly developed and operated by both countries, and which will provide equal protection for both countries. This is, in fact, a requirement for strategic stability. But we will never share our most advanced and sensitive technologies with Russia, when Russia is one of the countries we would be protecting ourselves against. Yeltsin's support for defense is just a ploy to gain U.S. support in other, more substantial areas.

Second, defenses will stand in the way of deep cuts, because a system that is highly effective against limited strikes (200 warheads) will have significant capability against much larger arsenals. Russia will be unlikely to make deep cuts if it believes that we could shoot down much of its remaining arsenal. Deep cuts is a surer and safer path to a stable peace than defenses.

Third, GPALS is unnecessary to guard against accidental or unauthorized launches from Russia. If we are really worried about this possibility, then don't we simply agree to equip missiles with a command destruct system, as is done with test missiles to prevent them from landed in populated areas? Such systems would be far cheaper and more effective than GPALS, and would not be destabilizing because they could be turned off by the command authorities during a crisis. Fourth, GPALS is ineffective against the third-world threat. Some form of missile defense might be useful against other countries, but the threat is likely to remain limited or nonexistent for some time. Aside from China, only Israel and India could have an ICBM capability before the end of the century.

And ballistic missiles are one of the least likely ways in which nuclear warheads would be delivered from a third-world country; airplanes, cruise missiles, or ships are far simpler and almost impossible to defend against.

Buying GPALS is like buying expensive earthquake insurance before you have fire insurance. Sure, earthquakes are possible, and it would be nice to insure against that remote possibility if

the cost was not unreasonable, but fires are much more likely to destroy your home. In fact, having a missile defense would make the other modes of delivery even more attractive.

Significantly, the ABM Treaty is the only arms control treaty for which the Bush administration has not asked the republics of the former Soviet Union for their continued compliance. Many observers believe that this is a prelude to the administration formally asking to revise the treaty to permit GPALS, or, if Russia refuses, to simply go ahead and abrogate the treaty.

This would be a serious mistake. The ABM Treaty is the very foundation of nuclear arms control; without limits on defenses, it has been impossible to agree on offensive limits. We may believe that we can go ahead anyway and ignore the protests of the former Soviet Union, because there is little that Russia can do about it in any case.

So SDI or its more limited variants are unlikely to be part of a stable peace. Indeed, they are likely to make matters worse in the short term, by strengthening the arguments of Russian hard-liners and preventing deep cuts.

Finally, I would like to turn to the future role of arms control in slowing the spread of nuclear weapons and other weapons of mass destruction. As regards the former Soviet Union, I am confident that all republics except for Russia will renounce any claims to nuclear weapons stationed on their territory, and that these weapons will be destroyed or moved to Russia without incident. This process, which will take 2 to 5 years, should proceed as quickly as possible, however, to guard against a sudden deterioration in the political situation.

And while I applaud the Bush and Gorbachev initiatives to eliminate several classes of tactical nuclear weapons, which are the easiest weapons to steal, and to place the remainder in secure central storage, I am impressed with the physical security measures controlling the movement of nuclear weapons that have been described to us by Russian generals.

If the former Soviet Union has a proliferation problem, it is in the form of the expertise held in the minds of thousands of scientists and engineers--and not only in nuclear weaponry, but also in chemical and biological weapons and ballistic and cruise missiles.

This is a difficult problem to solve, although U.S. financial assistance can certainly be part of the answer. In addition to direct transfers to aid in weapon dismantlement, the U.S. could lend its assistance in converting weapon laboratories and production facilities to civilian R&D and production. The \$25 million that the U.S. has pledged for this so far is at least a factor of ten, and probably a factor of 100, too low.

U.S. and Russian intelligence agencies should work together to detect attempts by foreign governments or subnational groups to buy expertise, sensitive technologies or the weapons themselves. We should also encourage Russia and other republics to enact civil laws making it a crime to transfer weapon technology to other countries.

As regards proliferation in other areas of the world, I have already mentioned to arms control initiatives that could be valuable: a fissile-material production ban, and a comprehensive test

ban. Both initiatives would strengthen the nonproliferation regime and increase the probability that the NPT will be renewed with an indefinite term, without possibly harmful renegotiation.

Other, more far-reaching initiatives, might include a ban or strict limitation on the flight-testing of ballistic missiles. We might, for example, ban the testing of ballistic missiles with a range greater than 300 kilometers. Space launches could continue unimpeded, allowing the development of large missiles but not reentry vehicles.

A flight test ban would make the development of new U.S. missiles impossible, and it might decrease the reliability of current missiles, but the U.S. and Russia already have a full complement of accurate and reliable missiles. A test ban that achieved universal adherence would, however, prevent the emergence of ballistic missiles forces that could threaten the United States or its close allies.

The early completion of the Chemical Weapons Convention, and the addition of strict verification provisions to the Biological Weapons Convention, would also help.

Although I won't talk about it in detail, arms control should also have an important role in constraining the sale of conventional weapons--tanks, artillery, armored personnel carriers, and attack aircraft--worldwide.

In summary, these are exciting times. We have, in the next few years, a truly historic opportunity to build the security framework of the future. Such opportunities are few and far between, and we should be humbled by the fact that we did not do so well with past opportunities, for example, after the last two world wars. History teaches us that we must pay careful attention to the terms of the peace, and that we must give due consideration to the legitimate security concerns of other nations--especially other great powers, even those that are conquered.

Arms control has an important place in building a stable peace--a "warm peace," not "Cold Peace." We must guard against the twin hazards of lack of interest and narrow self interest. By pursuing verified, deep reductions we can promote transparency, trust, stability, and nonproliferation, while making a return to the old ways virtually impossible.

Physicists have an important role to play in this process, in inventing new verification technologies, providing technical evaluations of ballistic missile defenses, supporting appropriate limits on defense research and development, and in supporting our Russian colleagues as they attempt to apply their skills to civilian science and to improving the quality of life for Russian citizens.

I hope you will join me in this endeavor.

Thank you.