Background

Many nongovernmental groups are exploring the question of the future of nuclear weapons policy and arms control. Some of these groups, such as the Canberra Commission, which included former Secretary of Defense McNamara and former chief of the Strategic Air Command, General Bulter, the Stimson Center group chaired by Gen. Goodpaster, and Pugwash, focus on the long-term objective of nuclear disarmament.

Other groups, such the National Academy of Sciences study chaired by former ACDA director Gen. Burns, and a Brookings study chaired by Frank von Hippel, focus the nearer-term objective of deeper cuts in nuclear weapons, together with changes in targeting doctrine and nuclear operations. I've had the good fortune to be associated in one way or another with all of these efforts, and I think I can represent their views reasonably well here.

A common element in the agenda of all these nongovernmental groups is direct controls on nuclear warheads. To date, nuclear arms control has focused almost exclusively on limiting the number and characteristics of deployed delivery vehicles; but the INF and the two START treaties take this approach about as far as it can go. The foundation they provide is too fragile to bear the weight of much deeper reductions, as we can see already in the Russian debate on START-II ratification.

Looking beyond START II, arms control will be able to significantly reduce the risks posed by nuclear weapons only if its scope is expanded beyond restrictions on delivery vehicles. I believe that the greatest gains lie in the area of nuclear operations and verifiable reductions in the readiness of nuclear forces to mount an attack. But in the area of nuclear hardware, the greatest potential security benefits would derive from direct controls on nuclear warheads.

I've noticed that the title of this conference mentions only the "elimination" of nuclear warheads, but I believe that an agreement on warheads should deal with much more than just elimination. As a realistic, near-term objective, the nongovernmental groups I've been working with advocate a limit of perhaps 2,000 to 2,500 total warheads—tactical as well as strategic, reserve as well as deployed. In this context, we would need a comprehensive verification system for nuclear warheads, similar in many ways to the system we have developed for delivery vehicles. It doesn't do much good to verify in detail the dismantling of 5,000 Russian warheads if you don't know how many warheads Russia has to within plus or minus 5,000--which is the uncertainty Larry Gershwin gave in Congressional testimony a few years ago. Verified elimination makes the most sense, and is most worthwhile in the context of an overall limit on the number of nuclear warheads.

Limits on the total number of nuclear warheads would have several benefits.

- First and most obviously, they could reduce the potential for Russian break-out, should U.S.-Russian relations sour.

- Second, warhead limits that reduced the potential for rapid U.S. breakout could make Russia more willing to ratify and implement START II and to agree on other types of arms control agreements that benefit the United States. Frankly, I think it's insulting to talk, as the discussion paper does, about eliminating Russia's breakout potential while preserving the U.S. hedge. If we aren't willing to eliminate our hedge, then I don't think there is much to talk about.

- Third, warhead limits allow us to get a handle on tactical weapons, which now have a free ride. Although the reciprocal unilateral reductions in 1991-92 cut tactical arsenals, there are disturbing signs that Russia is beginning to think of tactical

nuclear weapons as their first line of defense against an expanding NATO. I have a recent article by Minister Mikhailov in which he advocates building 10,000 new low-yield tactical nuclear weapons.

- Fourth, an agreement limiting warheads could give the U.S. valuable insight into the Russian nuclear complex. This would allow us to better evaluate the risks of theft or unauthorized use, and better target our assistance in reducing these risks, which may pose a greater threat to US security than the risk of deliberate nuclear use. The existence of such an agreement and accompanying verification provisions could stimulate improvements in Russian physical protection, control, and accounting.

- Finally, an agreement limiting the number of warheads would lay the foundation for much deeper reductions in nuclear arsenals, and it would demonstrate the U.S. commitment, under the NPT, to continue its pursuit of arms control and, ultimately, the elimination of nuclear weapons.

Although this agenda—a limit of 2,000 to 2,500 total warheads—may seem very ambitious, the groups with which I have been working believe we can and should begin negotiations toward this goal immediately. Allow me to sketch out, in outline form, a comprehensive verification regime that I believe could be implemented by the year 2005.

Verification Regime

Declarations. First, we should begin with a comprehensive data exchange or declaration of the location, status, type, and serial number of every nuclear device that exists. This declaration would be updated at agreed intervals—every six months or so. A registry of this sort was advocated by the National Academy of Sciences, and, briefly, by the German government.

The location of a warhead would be a particular storage bunker or delivery vehicle. The status of a warhead would indicate whether it's in the active or reserve inventory or whether it's slated for dismantling and, if so, when. If steps had been taken to render the warhead unusable, this could be indicated as well. The serial number probably could serve as a tag for the warhead, or special tags could be developed and applied for this purpose. Tags would greatly simplify verification by permitting the application of statistical sampling techniques.

I hasten to say that I think declarations would be valuable even without formal verification provisions, and that we should begin exchanging this data before we've worked out all the verification provisions. Early declarations would force Russia to make a decision about whether to tell the truth, at a time when their government is reasonably friendly and when there is little incentive to lie. The very act of putting together a declaration also might stimulate improvements in Russian accounting.

Baseline inspections. But the real value in declarations would come with their verification, and the second element of the verification regime would be baseline inspections to verify the accuracy of the declaration. There would be no great need, at least initially, to verify the number of deployed strategic warheads, since these would be covered by the START agreements. Since all tactical warheads are in storage, the baseline inspections would mostly involve warheads in storage bunkers.

For example, inspectors could visit a particular bunker and verify that the declared number of warheads is present—no more, no less. Alternatively, inspectors could select, at random, a small number of warheads for inspection, and could verify that the serial numbers or tags matched those listed in the declaration. I like the second approach better because it could greatly reduce the number of warheads that are examined.

For example, examining just 30 warheads would provide at least 95 percent confidence that the number of warheads at declared sites is no more than 10 percent higher than declared. Doubling the number of warheads examined would cut about in half the maximum violation that would go undetected at this level of confidence.

There are, however, two key problems in verifying a warhead declaration in this way. The first is knowing that an object which is declared to be a warhead of a particular type really is a warhead of that type. This could be dealt with by “fingerprinting” warhead types, and using random sampling to verify that a particular warhead is an authentic warhead of the declared type. For example, Russia could present an SS-18 warhead for fingerprinting, or one could be randomly selected from a deployed missile. A set of agreed characteristics could be measured: length and diameter; mass; the relative strength of neutron emissions or certain gamma-ray emissions at certain points on the exterior; or heat output. Such a signature could be extremely difficult to spoof. If these measurements would reveal sensitive weapon-design information that Russia didn’t want us to know, an automated system could be devised to give a simple “yes” or “no” answer to the question, “Is this an SS-18, mod 5 warhead?”

It shouldn’t be too difficult to build such a system, and I believe that a similar system has already been devised for pit inspections. Of course, we will have to balance our need for verification against the cost, complexity, and intrusiveness of the inspections. But I don’t think we have any really important secrets to keep from Russia anymore, at least with regard to the design of warheads in the stockpile. After all, Russia is no longer in the business of designing, testing, and building new types of nuclear weapons, and they couldn’t learn anything about our weapons that would somehow allow them to weaken or defeat our deterrent force. So I’d err on the side of transparency.

A second, more severe, problem in verifying declarations is knowing that they're complete. How would we know that Russia hadn't squirreled away a few hundred or even a few thousand warheads for a rainy day? Warheads are so small and need so little attention that we'll never be sure that some number hadn't been hidden. We can, however, reduce our uncertainties and, over time, develop confidence in the declaration.

Challenge or anytime-anywhere inspections are often mentioned as one way to detect undeclared warheads, if they exist, but I'm pessimistic about this because a well-designed plan to hide warheads would give few clues about where to look. So even if the other country wasn't cheating, the fact that you could do challenge inspections wouldn't by itself give you much confidence that they weren't cheating.

Another approach is to request historical information on the stockpile. For example, we could request a history for every nuclear device ever manufactured, including the dates and locations of assembly and disassembly and movement between various storage and deployment facilities. In addition, data could be presented on facilities at which nuclear weapons had been designed, tested, assembled, stored, deployed, repaired, and dismantled, and perhaps facilities that produced key warhead components and fissile materials. These records could then be examined for internal consistency, for consistency with the current stockpile declaration, and they could be compared to archived intelligence data. We might, for example, have detected the shipment of Russian warheads on certain dates, and we could check the declaration to make sure that it was consistent with this information. In addition, inspections could be requested of locations where nuclear weapons had been located in the past.

The point here isn't that uncertainties in the completeness of the declaration could be eliminated, but that current uncertainties, which are very large, could be reduced substantially, and that the long-term benefits would be well worth the trouble. Declaring and verifying production and stockpiles of fissile materials would also help in this regard, but that's beyond the scope of this meeting.

Dismantling. Now, having established a baseline inventory of nuclear warheads, we can proceed to verifiably dismantle them. Direct verification of warhead dismantling is thought to reveal too many secrets (although again, I'm skeptical about the strategic importance of these secrets). A more indirect method is desirable, and the most obvious solution is to construct a perimeter-portal monitoring system at the dismantling facility. The portal would be designed to detect and to monitor the inflow of nuclear warheads and the outflow of pits and other key components. A particular nuclear warhead which enters the facility would be counted as dismantled when the corresponding pit is placed in monitored storage. If desired, the pits could be fingerprinted and associated with particular warhead type.

The portal would be equipped with a system to verify the authenticity of warheads entering the facility, and would with radiation detectors capable of detecting any fissile materials exiting the facility. Components contained plutonium or uranium would be stored pending their ultimate disposition under mutual monitoring; other components could be destroyed or recycled, as agreed by the parties. Again, sampling could be used to minimize the number of warheads or pits that are subjected to detailed examination.

A possible complication is the fact that warhead maintenance and remanufacturing activities would still be occurring. To deal with this, it might be best to have a separate perimeter-portal monitoring system for these activities, even if they are carried out at the same facility. For example, Pantex could designate a certain area for maintenance and remanufacturing, and another area for dismantling. It would be necessary, of course, to verify that the maintenance facility wasn't being used to build new warheads, but you could do this by requiring a strict balance between the number of warheads and pits entering and exiting the maintenance facility.

Some people worry that Russia could, in this way, learn of vulnerabilities in the U.S. force. Russia might, for example, notice that all the W-76 warheads were being rebuilt and conclude that that system had a major reliability problem. It's hard for me to get too excited about this; after all, what are the Russians going to do about it? Threaten to attack? Why would they believe that our weapons wouldn't work? Also, I assume that we will maintain a sufficiently diversified arsenal, with the ability to mix and match missiles and warheads, so that this wouldn't be a severe problem.

Conclusion

Well, that's about it. I know I've been short on specifics, but it's hard to get much more detailed without detailed knowledge about the nuclear weapons complexes, and there are people here who know far more about that than I do. I think I've given a fair representation of the direction along which the various nongovernmental groups I mentioned earlier are thinking. Various elaborations have been mentioned, such as consolidating all of the warheads to be dismantled at a single site, which is then subjected to perimeter-portal monitoring, but that's a straightforward extrapolation. I've also heard mentioned the idea of somehow rendering nuclear warheads unusable before dismantling, but I'm unclear on how this would be done. It seems to me that it would either be quick and straightforward, and therefore easily reversible, such as removing tritium bottles or the fusing and firing sets; or it would be time-consuming and difficult to reverse, in which case we'd probably be better off focusing on dismantling.

I'd just like to end by saying that an agreement to verifiably dismantle nuclear warheads should be seen as just one component of a more comprehensive agreement to restrict and greatly reduce the number of nuclear weapons, and that even that should be seen as part of a broader arms control effort to reduce nuclear risks, including measures to change nuclear doctrine and reduce readiness. I hope that we can develop and present to Russia a comprehensive plan, rather than deal with individual measures, such as dismantling, in a piecemeal fashion.