
Kiev Conference: Verified Warhead Controls

Christopher Paine and Thomas B. Cochran

In mid-December 1991, when the Ministry of Defense of the former Soviet Union announced that the removal of its tactical nuclear weapons from Ukraine had already begun, no U.S. or United Nations inspectors were on hand to verify the process, despite the desire of the new Ukrainian government for international inspection and suggestions that the new Russian government might be willing to grant it. The main obstacle, as it turned out, was not in Moscow or Kiev, but in Washington, where the Bush administration's erstwhile advocates of "effective verification" were insisting that "unilateral" arms reductions should not be subject to verification. As we discovered in December, on a visit to Moscow and Kiev to discuss verified warhead dismantlement, Russian officials are not prepared to accept international verification of the movement and disposal of their nuclear warheads and materials unless the United States reciprocates.

Meaningful verification is needed now, not so much because of lingering Cold War fears that Russia might gain some unilateral advantage by hiding weapons, but because international controls will help ensure against the dangers of diversion or theft of nuclear weapons or materials from the far-flung Soviet arsenal, and lay the groundwork for deeper nuclear cutbacks. Ultimately, verified controls on nuclear warheads and materials would give the international community an inventory of Soviet stockpiles, along with firm knowledge of which weapons had been destroyed and which remained, and where both the fissile material they contained and the other available fissile material had gone.

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Yet, despite the evident value of verified controls on nuclear warheads and fissile materials, the Reagan and Bush administrations have fiercely resisted such measures. The administration apparently remains tied up in Cold War concerns that such verified controls would limit future U.S. options to produce weapons and materials, or give away sensitive weapon design information. As a result, neither the Intermediate-range Nuclear Forces (INF) Treaty of 1987 nor last year's Strategic Arms Reduction Treaty (START) requires any warheads to be dismantled. Similarly, both administrations have rejected a verified cutoff in the production of weapon-grade fissile materials, despite Soviet proposals, congressional pressure, and the *de facto* end of U.S. production. (As recently as December, a top Pentagon official derided such proposals as "propaganda.") While President Bush's nuclear cutback initiatives of last September finally called for dismantling thousands of warheads, the administration has resisted any form of verification for these dismantlements.

In November, Congress appropriated \$400 million to assist the former Soviet republics in dismantling nuclear warheads. But the funds are tied to presidential cer-

tification that the former Soviet republics are committed to not reusing the fissile materials from dismantled warheads in new weapons, and to facilitating U.S. verification of warhead dismantlement. Hence, if the Bush administration continues to complicate matters by refusing inspection of the U.S. nuclear weapon stockpile, the anticipated technical and financial cooperation in warhead dismantlement may never be implemented.

Meetings in Moscow

In the face of the administration's continuing hostility toward verifiable warhead and material controls, virtually the entire U.S.-Soviet dialogue on these questions has been carried out at the "unofficial" level. A key part of this dialogue began in 1987 with a cooperative project between the Federation of American Scientists (FAS) and the Soviet Academy of Sciences. These discussions have continued through the political upheavals in the former Soviet Union. In October and December of last year, these talks culminated in a higher-level but still unofficial exchange involving the Natural Resources Defense Council (NRDC), FAS, scientists from the Los Alamos and Livermore national laboratories, representatives of the former Soviet and new Russian Foreign Ministries, the scientific directors of the two Soviet weapon laboratories, senior officials from the Ministry of Atomic Power and Industry (MAPI), and senior officials from the Parliament, Foreign Ministry, and Defense Ministry of Ukraine.

At a December 18-20 workshop in Kiev, NRDC and FAS sought to fulfill two objectives: to understand the positions of the various parties involved in the warhead elimination process in the new Commonwealth of Independent States, and to jump start verified inventory control of Soviet warheads withdrawn from Ukraine by encouraging Russian and Ukrainian authorities to begin their own bilateral program, with the hope that the United States

would agree to join at a later date. Ukraine is a particularly important test case, for it has more nuclear weapons on its soil than any other non-Russian republic (including over 1,700 strategic weapons and some 2,200 tactical weapons), and it has already agreed to eliminate all tactical weapons on its territory by July 1 of this year, and all strategic weapons by 1994.

While we succeeded in learning a good deal about the former republics' approach to warhead dismantlement and control, we were stymied in starting a verification program by the former Soviet Ministry of Defense's insistence that there could be no verification without U.S. reciprocity.

Our meetings began in Moscow, with a surprise arrival banquet hosted by representatives of the International CHETEK Corporation, who used the occasion to promote their proposals for using peaceful nuclear explosions to dispose of chemical and nuclear wastes, including thousands of plutonium "pits" from nuclear warheads (see p. 32). CHETEK turned out to be the principal underwriter of the delegation's in-country expenses, a fact not known to the U.S. delegation beforehand. MAPI Deputy Minister Viktor N. Mikhailov, the official in charge of the Soviet nuclear weapon production complex, and CHETEK President Vladimir Dmitriev disclosed the general terms of an agreement reached in May 1991, under which CHETEK is financing nuclear explosive technology research at the Arzamas-16 nuclear weapon laboratory, for the avowed purpose of nuclear waste destruction.

It was clear in Moscow that Russian officials believe that cooperative verification measures covering the nuclear warhead elimination process and fissile material storage are both desirable and achievable. If the Bush administration presented a reasonable proposal for implementing these measures, Russian participants assured us it would be accepted. Some of the new reform-minded leaders of the Russian foreign policy establishment explained that they personally would have no problem with Russia unilaterally initiating verification arrangements with the other Commonwealth states, without prior agreement on reciprocity from the United States. But they noted that Russia was now "a pluralistic society, where conservative elements hold powerful positions." They feared that unilateral Russian implementation of warhead verification measures would provide an opening for "right-wingers" to accuse the democratic reform forces of "selling Russian security down the river." They also noted the Bush

administration's continuing lack of interest in any measures of this kind.

General Geliy Batenin, for example, a top arms control adviser to Russian President Boris Yeltsin, seemed quite supportive of a verified end to production of fissile material and verified elimination of nuclear warheads. Batenin indicated that warhead elimination is currently carried out at two sites, which are now dismantling about 1,500 warheads per year, but that with the end of new warhead production and some investment in new equipment, this rate could be doubled or tripled.

In a meeting at MAPI, Mikhailov repeated MAPI's proposal—which he said was supported by the Ministry of Defense—to spend the entire \$400 million appropriated by Congress on a facility to store plutonium, with perhaps \$10 million to \$100 million going to civic improvements in the area where the site was to be located, to ensure local acceptance. Mikhailov estimated that there would be 10,000 to 20,000 nuclear weapons dismantled under former Soviet President Mikhail Gorbachev's nuclear cutback initiatives, and explained that the large uncertainty derived from ambiguities in Gorbachev's announcement. Subsequently, CIA Director Robert Gates told Congress that officials of the former Soviet Union had told the Bush administration that 15,000 weapons would be eliminated.

Resistance From the Military

The major workshop on warhead dismantlement was held in Kiev, and included substantial delegations of Ukrainian officials and representatives of MAPI and the former Soviet Ministry of Defense. The Ministry of Defense delegation was led by Sergei A. Zelentsov, a two-star army general and chief engineer for the ministry's 12th Main Directorate, the branch in charge of nuclear weapons. Zelentsov's closest U.S. counterpart is perhaps the commanding general of the Defense Nuclear Agency, which oversees the transport, safety, and maintenance of nuclear weapons while they are in the custody of the armed forces.

In what amounted to a preemptive strike against the idea of independent verification of the elimination of nuclear warheads removed from Ukraine, Zelentsov led off the workshop by opposing any verification measures which had not been formally agreed upon "by the two presidents" in their nuclear cutback initiatives. Since neither Gorbachev nor Bush

had raised the need for additional control measures, Zelentsov maintained that there was no political basis for the Ministry of Defense to pursue such measures. "No inspections of nuclear weapons by strangers are allowed," Zelentsov said, pointing out that strict procedures had been designed to exclude access to nuclear weapons by "journalists, terrorists, and other outsiders." If tags were to be applied to both U.S. and Soviet weapons, this should be done by Ministry of Defense personnel or a special inspectorate created for that purpose, Zelentsov argued.

Moreover, Zelentsov indicated that tags are unnecessary for tracking warheads through the dismantlement process, because all Soviet warheads and their principal components are stamped with serial numbers, allowing Soviet army inspectors to register each warhead and follow it from production through dismantlement. Zelentsov also said that the idea of sealing warheads in canisters was "dangerous," because once the warheads were sealed in, "no other operations could take place to transfer the weapons into a safer state." In addition, Zelentsov pointed out that Bush and Gorbachev had not agreed to restrict the recycling of removed fissile material into new weapons.

In rebuttal, members of the U.S. delegation explained that the purpose of sealing was not to *prevent* access to the warhead, but to *reveal* when someone had gained access without authorization or notification, and that seals could be applied *after* the weapons had been disabled and made safe prior to shipment to storage facilities in Russia. The Americans also pointed out that Soviet and Ukrainian military personnel accustomed to handling nuclear weapons could themselves apply the tags and seals, with a minimum of direct involvement by the inspecting party.

NRDC representatives had brought a dozen "warhead verification kits" to demonstrate commercially available techniques for tagging and sealing warheads or warhead containers. One tagging approach, developed by the Verification Program at Argonne National Laboratory, involves producing several identical impressions of a small surface area of a warhead or warhead canister using a special tape, to which a bar code label is attached, similar to one that is commonly scanned at a supermarket checkout counter. These impressions can be examined with varying degrees of precision ranging from a simple magnifying glass to an electron microscope; the latter produces a unique three-dimensional image that is impossible to

falsify. One of the authors (Cochran) demonstrated this approach by tagging the back of his wristwatch. Using this system, it would be possible to tag all nuclear weapons based in Ukraine in a matter of weeks, and all the nuclear weapons of the United States and the former Soviet Union within a few months, for a very modest cost. Such tags would provide a means to check that all warheads identified during the tagging process are ultimately destroyed; and once all weapons had been tagged, any discovery of an untagged warhead during a random inspection would constitute *prima facie* evidence of illegal weapons beyond those declared.

The NRDC also demonstrated two types of seals, used to ensure that no one has tampered with a container or removed the warhead from it without notification. These seals use fiber-optic cables that can be routed through or around a warhead canister. One or both ends of the cable are inserted into a special padlock, which randomly crimps the cable, producing a unique light pattern that can be photographed or videotaped for future comparison. Any tampering with the cable would produce a different light image which would be easily detected.

Emphasizing that during an earlier workshop in Washington in October a Soviet Foreign Ministry-MAPI delegation had agreed that it was important to begin the tagging process, Cochran urged that the parties should attempt to reach a preliminary agreement to begin at least a pilot warhead tagging project. General Zelentsov made it clear, however, that U.S. reciprocity was a precondition for further progress in this field.

Vitaly Schukin, on the other hand, a nuclear weapon designer from the Chelyabinsk-70 design lab, proposed joint study of a warhead dismantlement approach similar to that elaborated by an FAS-Soviet Academy study group in 1988-1990. Schukin's concept would involve placing each warhead in a unique storage container, which would then be tagged and sealed. On arrival at the dismantlement facility, the warhead would be "authenticated" by examining its weight and radiation "fingerprint." The warhead would then be disassembled, the chemical explosive burned, the fissile material placed in secure storage under bilateral or international safeguards, and the remaining components crushed.

There was considerable discussion of how the \$400 million appropriated for assistance in warhead dismantlement should be spent. Zelentsov, like former Soviet offi-

cial in discussions with U.S. teams led by Undersecretary of State Reginald Bartholomew, argued that officials of the new Commonwealth are perfectly capable of handling the business of transporting, storing, disabling, and dismantling nuclear weapons, and do not need assistance in those tasks. "The main bottleneck is storage space for plutonium," Zelentsov said, echoing MAPI's proposal to use the \$400 million to construct a plutonium storage facility. Zelentsov also indicated that ministry officials would "be grateful" if the United States could provide special equipment for transporting weapons and fissile material, such as shielded vehicles and rail cars.

Time for Reciprocity

The workshop heard a brief presentation by Viktor Batjuk of the Ukrainian Foreign Ministry, who emphasized the Ukraine's plan to become a non-nuclear-weapon state and its desire for a veto over the use of nuclear weapons until they were removed from Ukraine—both later incorporated in the Minsk Commonwealth accord of December 30.

Although generally sympathetic to the idea of international inspection of the withdrawal of nuclear weapons from Ukrainian territory, Batjuk stressed that U.S. participation in this process would be easier to establish if the United States accepted reciprocal inspection of its own forces. Absent such agreement, he indicated that Ukraine would be satisfied with the participation of Ukrainian military personnel in the warhead removal and elimination process. Batjuk noted that Ukrainian specialists already participate in the "groups of observers and inspectors" for the Strategic Arms Reduction Treaty, and that verifying the warhead removal process would constitute "inspection between allies." Batjuk indicated, however, that Ukraine would place "final reliance" in establishing that warheads had been destroyed on the application of international safeguards to the plutonium and highly enriched uranium removed from the warheads.

General Zelentsov expressed his "complete solidarity" with Batjuk's remarks, and stated that such Ukrainian participation would be possible, but offered no further details. (Later, in the Minsk accord, it was agreed that Ukraine and Belarus would participate in the elimination of the weapons removed from their territory, but the nature of this participation has not yet been disclosed.)

In short, the workshop made clear that there will be little progress on verifiable control of the thousands of weapons and hundreds of tons of weapon-grade plutonium and highly enriched uranium in the weapon stockpile of the former Soviet Union unless the United States accepts the principle of reciprocity. Such verification can easily be arranged in ways that do not reveal sensitive nuclear weapon design information, and methods are already available that can be implemented within months at remarkably low cost. Such a regime would include:

- a data exchange on the total number of warheads by type, and the total masses of plutonium and highly enriched uranium metal in and outside of warheads;
- an exchange of serial numbers and locations of warheads, which would be updated every six months;
- disclosure of the fraction of the total fissile material stockpiles accounted for by specific classes of warheads scheduled for elimination;
- tags on all warheads or their sealed containers;
- agreed, relatively nonintrusive verification of warhead destruction, potentially by inspectors simply confirming that actual warheads of a declared type were entering a dismantlement facility, and that fissile material of a given quantity and crushed components were leaving it; and
- international safeguards over fissile material removed from weapons, other stocks including civil stocks, and plants capable of producing such material.

Moving forward with such a multi-lateral program of verification would go a long way toward containing the new proliferation threat emanating from the former Soviet Union, and could provide the basis for a global nuclear inspection regime. By making clear that there are no large, unknown stockpiles of weapons and material, it would lay the groundwork for achieving deep reductions in nuclear weapons.

The opportunity is still there, not only in the former Soviet Union, but in every declared and undeclared nuclear-weapon state. If the United States truly desires to halt the proliferation of nuclear arsenals and dramatically reduce the global inventory of nuclear weapons and fissile materials, the technical and political path to achieving such a world has been opened by the denuclearization agenda of the new nations of Ukraine, Belarus, and Kazakhstan. What is still lacking is an American administration with the wisdom and foresight to bring such a world into being. ACT