

Controlling Nuclear Warheads and Materials

A Report Card and Action Plan

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13. Monitoring Stockpiles and Reductions

In and of themselves, transparency and monitoring measures – such as declaring how many nuclear weapons and how much nuclear material a nation has, or placing portions of these stockpiles under bilateral or international monitoring – do not prevent insiders or outsiders from stealing these stockpiles.¹ But such measures, if well designed, can contribute substantially to improving security and accounting for nuclear weapons and materials, in a number of ways:

■ **Sizing the problems.** Neither Russia nor any other nuclear weapon state has ever officially confirmed how many nuclear weapons it has. Nor has Russia or most other nuclear weapon states made any statement as to how much plutonium or highly enriched uranium (HEU) they have in their stockpiles.² This lack of official information, forcing reliance on uncertain estimates from various sources, inevitably makes it more difficult to specify the scope of the problems involved in insecure nuclear weapons and materials, and to plan programs to address these problems. Official declarations related to these stockpiles could help size these problems and thereby ease the task of fixing them.

■ **Facilitating cooperation.** Being able to discuss which facilities are at issue, which buildings at those facilities have nuclear weapons or materials in them, the quantities and types of materials at these facilities, and the like is crucial to

being able to work out effective cooperation for improving security and accounting measures. Direct access to these sites is often also crucial, in order to observe the security and accounting measures already in place, and to confirm that upgrades are being done to agreed standards and that money is being spent appropriately. If information has already been exchanged, and access has already been agreed to, through some type of monitoring arrangement, other cooperative efforts are greatly facilitated. For example, because of START monitoring provisions, there have been few problems with access or information in threat reduction programs focused on dismantling nuclear missiles and bombers. But because no such monitoring arrangements had ever been agreed for warhead storage facilities, arranging the information and access needed to cooperate effectively in upgrading security for these facilities has proved to be tremendously difficult. Caution is warranted, however, because there may be some cases in which a negotiation over monitoring arrangements turns access to a particular site into a bargaining chip, making it *more* sensitive than it would have been had the monitoring negotiation never taken place.

■ **Identifying weak points.** Inspectors or visitors sometimes identify weak points in security and accounting. In several cases, reports by International Atomic Energy Agency (IAEA) inspec-

¹ An exception would be very far-reaching transparency amounting to partial ceding of sovereignty over these stockpiles and operations using them. Over the years, for example, there have been a number of proposals to require that facilities handling weapons-usable nuclear material in the civilian cycle be under international, rather than national, ownership and control – which might also mean an international guard force. One Sandia analyst has put forward a concept in which every U.S. and Russian facility where nuclear weapons or weapons-usable materials were stored would have a perimeter patrolled by both U.S. and Russian guards, and nothing could be brought out of the perimeter without joint inspection. See Robert Rinne, *An Alternative Framework for the Control of Nuclear Materials* (Stanford, Cal.: Center for International Security and Cooperation, May 1999). We believe such an arrangement would substantially improve security, but is unlikely to be acceptable to either government (or the governments of other countries where it might be applied) in the near term.

² The United States released a very detailed statement on its plutonium stockpile in the mid-1990s, but many other weapon states have not followed suit, and the United States itself has neither updated the publicly released information nor fulfilled a promise to release similarly detailed information on its production and stockpile of HEU.

tors to the IAEA Office of Physical Protection on situations in which nuclear material they inspected did not appear to be adequately secured have been followed by the IAEA successfully cooperating with the states concerned to arrange for international peer reviews and upgrades of the security arrangements.³ Similarly, to support IAEA safeguards, states must prepare their own accounting of the nuclear materials under their control, and provide this accounting regularly to the IAEA. Examination of such national reports often makes it possible to identify facilities where the quality of the measurements taken and the accounts kept needs to be improved if there is to be confidence that nuclear material has not been removed. Thus, international safeguards create a multilateral discipline in nuclear material accounting that is not present in nuclear weapon states such as the United States and Russia, or at unsafeguarded facilities in states such as Pakistan, India, and Israel. Of course, transparency measures do not have to involve formal inspection such as IAEA safeguards to fulfill this role: informal visits by U.S. personnel to Russian facilities, for example, have been the main means of identifying and agreeing on areas where security and accounting upgrades were needed.

■ **Encouraging states to fix potentially embarrassing problems.** The very process of preparing for a declaration forces a state to examine its own internal accounts and try to put them in order, so as to avoid embarrassment when the declaration is made. When South Africa, for example, was preparing to submit its nuclear program to IAEA safeguards, it made sure, to the best of its ability, that all of its accounting records for its nuclear material had been brought into balance. Once a declaration is made (for example, as part of an arms control agreement), the other parties have an opportunity to ask questions and raise concerns, which may then lead to further accounting improvements. In its first declaration under the Intermediate-range Nuclear Forces (INF) Treaty, for example, the United States neglected some aging Pershing I missiles stored in Texas; Soviet arms experts pointed out the omission, and the

United States corrected the declaration. These kinds of discussions can open the way for additional correction of embarrassing problems, or identify fruitful areas for cooperation in improving accounting. The potential arrival of inspectors at a facility creates an additional incentive to remove any potential embarrassments – cleaning up, fixing holes in fences, replacing obviously broken equipment, and the like. These very mundane, human reactions to the prospect of being held up to the scrutiny of the outside world can produce significant improvements in security and accounting arrangements.

■ **Detecting thefts – or providing confidence that they have not occurred.** In some cases, while monitoring measures cannot in themselves *prevent* thefts, they may be able to *detect* that they have occurred. IAEA safeguards, for example, are designed to be able to detect the removal of enough nuclear material for a bomb – though the removal may not be noted until days or weeks after it has occurred. Real-time monitoring – such as with security cameras uploading their data to a central station or a satellite – can provide detection of thefts in progress, triggering response forces to intercept the thieves. In the more usual case in which no theft has occurred, accurate accounting systems and inspections can confirm for all participants that this is the case.

In short, transparency measures such as declarations and monitoring have considerable importance even if considered only as part of the effort to keep nuclear weapons and materials out of hostile hands. Such measures play a crucial part in the broader arms reduction picture, as they are likely to be an essential foundation for future agreements to reduce the still huge stockpiles of nuclear warheads and materials that exist around the world.

In pursuit of these benefits, the United States should pursue a step-by-step approach toward increased transparency for warheads and fissile materials with Russia, and ultimately with other nuclear states. This approach should be designed to maximize its contribution to the theft-prevention

³ Personal communication with IAEA personnel, September 2002.

goals just outlined. Building nuclear transparency will not be easy. The United States still maintains an extensive nuclear secrecy system built up over the decades of the Cold War – a system which is still essential to keep critical nuclear information out of the hands of terrorists and hostile states. Russia's nuclear secrecy system is even more stringent, built on decades of Communist obsession with secrecy, following centuries of similar Czarist obsession. Hence, to move this agenda forward, the U.S. government will have to focus on finding a balance between the benefits and risks of transparency and of secrecy, and clearly identify what transparency measures it is willing to accept at its own facilities. The United States should then offer clear and tangible benefits – financial, strategic, or otherwise – to Russia and the other states with whom it seeks to build transparency arrangements. Otherwise, it is highly unlikely that Russian officials or those of other states will conclude that the hard work of overcoming decades of nuclear secrecy is worth doing. Reciprocity – offering the same types of transparency in the United States – is likely to be essential to success, but is not likely to be sufficient in and of itself. Offering reciprocity – rather than the “pay per view” approach the United States has sometimes taken, arguing that it is providing money to help Russia disarm, and therefore should get transparency without having to accept similar measures in the United States – will help build confidence in U.S. intentions, and impose a useful discipline on U.S. transparency demands (since for every type of sensitive information it wanted, or type of sensitive site it wanted to visit, it would have to offer reciprocal access in return). Specifically, the United States should pursue the initiatives described below.

Recommendation: Offer Russia and other partners with whom the United States is negotiating transparency arrangements substantial incentives – strategic, financial, or other – to do the hard work of overcoming decades of nuclear secrecy. As one necessary but not sufficient step, offer reciprocal information about and access to U.S. nuclear activities.

Stockpile Declarations

The United States should seek, through formal and informal channels, arrangements in which the United States and Russia tell each other how many warheads and how much plutonium and HEU they have. These would be particularly useful means of “sizing the problem.” As a first step, the United States should press to bring to fruition the current informal lab-to-lab work on a Russian “plutonium registry” – a declaration of past production and current stockpiles comparable to the one made by the United States in 1996. If such plutonium declarations were successfully completed, they could be followed with similar lab-to-lab development of detailed declarations on each country's stockpile of HEU. (In both cases, other weapon states should also be invited to prepare similar declarations.) A warhead data exchange would likely be less detailed, at least initially. The United States should offer tangible incentives for Russian participation – such as an offer to finance the dismantlement of any warheads Russia declares as excess to its military needs, or an offer to purchase 5% of whatever stockpile of HEU Russia declares it has.

In parallel, the United States and Russia should jointly demonstrate and deploy approaches to helping to confirm the accuracy of such declarations, such as exchanges and analysis of production records, “nuclear archaeology” measures to estimate the plutonium production of particular reactors from the isotopes in their structures, and spot-checks of declared amounts at particular sites (if these can be arranged without undue sensitivity). There is a need to perfect such measures not only for U.S.-Russian applications, but also for any other situation in which a declaration of past unsafeguarded nuclear material production has to be verified – from Iraq to North Korea. The United States should be prepared to finance experiments with the implementation of such measures.⁴

Recommendation: Seek Russian agreement to exchange data on stockpiles of nuclear weapons and weapons-usable materials, beginning with

⁴ Thomas W. Wood, Bruce D. Reid, John L. Smoot, and James L. Fuller, “Establishing Confident Accounting for Russian Weapons Plutonium,” *Nonproliferation Review* 9, no. 2 (Summer 2002; abstract available at <http://cns.mii.edu/pubs/npr/vol09/92/abs92.htm#wood> as of January 14, 2003).

completing lab-to-lab efforts to prepare a full accounting of Russia's plutonium stocks and past production, comparable to the U.S. declaration published in 1996.

Building Bridges Between "Islands of Transparency"

To date, most U.S.-Russian discussions of transparency related to nuclear warheads and materials have focused on transparency at a particular site or small number of sites, necessary for a particular project – creating what might be called “islands of transparency.” Thus, there is transparency for the HEU Purchase Agreement, and there are to be separate transparency measures for the Mayak Fissile Material Storage Facility, the Plutonium Production Reactor Shutdown Agreement, and Plutonium Disposition Agreement. In the long term, however, the goal should be not “islands of transparency,” but a “sea of transparency,” with only particular “islands of secrecy” protecting secrets that still cannot be exchanged. For example, one might have monitors counting how many warheads enter a nuclear weapons disassembly facility and how many plutonium and HEU components leave the facility, while the actual disassembly would remain closed, to protect weapons design information. As a first step, the United States should work with Russia to ensure that “bridges” are built between the various “islands” now being put in place. For example, plutonium placed in tagged and sealed containers in the Mayak Storage Facility should have tags and seals that can be checked as it leaves the facility and arrives at another facility for the various processes needed to turn it into reactor fuel, bringing it under the future plutonium disposition transparency arrangements.

Recommendation: Build “bridges” among the different transparency initiatives now being pursued – such as transparency for the U.S.-Russian HEU Purchase Agreement, the Mayak Fissile Material Storage Facility, the Plutonium Production Reactor Shutdown Agreement, and the Plutonium Disposition Agreement – by reaching agreement on implementing tags,

seals, and other monitoring measures to ensure continuity of knowledge as material moves from one regime to the next.

Steps Toward Monitoring Warhead Dismantlement and Nuclear Material

For some years, U.S. and Russian experts have been working together to develop procedures that could be used to confirm warhead dismantlement, and storage and disposition of nuclear material, without compromising classified information. This work should be expanded. The United States and Russia should initiate discussions toward full-scale demonstrations – “joint monitoring experiments” – of procedures to be used to monitor the removal of warheads from missiles, storage of the warheads, and their transportation to dismantlement facilities, their dismantlement, and storage and disposition of the nuclear material they contain. Each of these steps could be the subject of a separate demonstration. The United States should be willing to finance such demonstrations, and to provide other incentives for Russia to take part.⁵ Such experiments could help pave the way for the initiative on reciprocal securing, monitoring, and dismantlement of particularly dangerous nuclear weapons, described previously.

Recommendation: Conduct a series of joint monitoring experiments to develop and demonstrate procedures for confirming warhead dismantlement and secure storage of warheads and materials without unduly compromising sensitive information.

Recommendation: Carry out monitored storage and dismantlement of the excess warhead covered by the reciprocal warhead security and dismantlement initiative recommended above

Recommendation: Take a flexible approach to providing assurances that taxpayer funds are being spent appropriately at particularly sensitive facilities, combining direct on-site access at some locations with other measures such as photographs and videotapes of installed equipment.

⁵ For a recent discussion, see Oleg Bukharin and James Doyle, “Transparency and Predictability Measures for U.S. and Russian Strategic Arms Reductions,” *Nonproliferation Review* 9, no. 2 (Summer 2002; abstract available at <http://cns.miis.edu/pubs/npr/vol09/92/abs92.htm#bukh> as of January 14, 2003).