

*Monitoring Stockpiles and Reductions*

Progress is even slimmer in bringing transparency to the management of nuclear weapons and nuclear materials, needed to lay the basis for effective long-term

cooperation on security and accounting, and for deep reductions in nuclear warhead and material stockpiles.<sup>41</sup> A variety of informal approaches have made some headway: both sides (and particularly the United States) have unilaterally revealed substantial amounts of information about their nuclear stockpiles and complexes, and the level of U.S. and Russian access to the other side's nuclear facilities as part of the MPC&A program, lab-to-lab cooperation, and other programs that exists today would have been unthinkable as recently as early 1994. But formal transparency discussions between the two governments have produced virtually nothing but a trail of unfulfilled agreements (see "The Transparency That Never Happened," p. 47).

There have been three fundamental reasons for this lack of progress: (a) the legacy of 70 years of Communist secrecy (and a millenium of tzarist secrecy before that) has made Russia extraordinarily reluctant to open nuclear secrets; (b) many parts of the U.S. government have also been reluctant to open key U.S. facilities and operations to Russian examination (which has sometimes manifested itself in demands that Russia accept inspections in return for U.S. assistance, with no reciprocity on the U.S. side—a "pay-per-view" approach that has aggravated Russian suspicions of U.S. motives); and (c) the U.S. government's failure to offer any significant strategic or financial incentives that would make it in the interest of the relevant Russian officials to do the difficult and politically risky work of overcoming the many obstacles to moving forward with a broad nuclear transparency regime. In short, there is plenty of blame to go around on both sides—and these problems will inevitably be even more difficult to address with souring U.S.-Russian political relations, redoubled Russian reliance on nuclear weapons, and the intense U.S. focus on protecting nuclear secrets in the wake of the China spying scandals. But there remain opportunities, described below, for new transparency initiatives incorporating targeted incentives designed to ensure that initiatives genuinely serve the interests of both sides equally. A new Russian President in firm control of the government might be in a position to move in bold new directions, should he choose to do so.

Despite the lack of progress on the formal negotiating track, extraordinarily useful lab-to-lab cooperation is underway to analyze and develop technologies and procedures for confirming the dismantlement of warheads while protecting sensitive information. The goal of this effort is to have jointly developed approaches already available when

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<sup>41</sup> For a useful current discussion of the status and prospects in this area, see Oleg Bukharin and Kenneth Luongo, *U.S.-Russian Warhead Dismantlement Transparency: The Status, Problems, and Proposals*, Princeton, NJ: Center for Energy and Environmental Studies, Princeton University, Report 314, April 1999. An overview of all the various U.S.-Russian programs in this area and how they fit together (or fail to) can be found in Bunn and Holdren, "Managing Military Uranium and Plutonium," op. cit. For an official description of the current priorities within DOE's program, see *Warhead and Fissile Material Transparency Program: Strategic Plan*, Washington DC: U.S. Department of Energy, May 1999. For discussions of what an overall transparency regime for warheads and fissile materials might look like, see National Academy of Sciences, Committee on International Security and Arms Control, *Management and Disposition of Excess Weapons Plutonium*, Washington DC: National Academy Press, 1994, Chapter 3; Steve Fetter, "A Comprehensive Transparency Regime for Warheads and Fissile Materials," *Arms Control Today*, January/February 1999 (available at <http://www.armscontrol.org/ACT/janfeb99/sfjf99.htm>); and Christopher Paine and Thomas Cochran, "Techniques and Procedures for Verifying Nuclear Weapons Elimination," in *Canberra Commission on the Elimination of Nuclear Weapons: Background Papers*, Canberra, Australia: Commission on the Elimination of Nuclear Weapons, 1996.

### The Transparency That Never Happened

High level U.S.-Russian transparency commitments that have never been fulfilled, and initiatives that have never been implemented, include:

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| January 1994:   | Presidents Clinton and Yeltsin agree on the objective of ensuring “transparency and irreversibility” of nuclear reductions and establish working group to work out specific measures. None of these measures have ever been implemented.   |
| March 1994:     | U.S. Secretary of Energy Hazel O’Leary and Russian Minister of Atomic Energy Mikhailov agree to mutual reciprocal inspection (MRI) of fissile materials from dismantled weapons beginning by the end of 1994. The inspections have never been implemented.   |
| September 1994: | Presidents Clinton and Yeltsin agree to exchange data on warhead and fissile material stockpiles by the end of the year. The exchanges have never occurred.  |
| May 1995:       | Presidents Clinton and Yeltsin reaffirm their commitment to transparency and irreversibility, to mutual inspections of material from dismantled warheads, and to warhead and material data exchanges, and agree to have experts explore several other transparency possibilities. None of these measures have ever been implemented, and the Russian side cut off talks in late 1995, never to resume them during the remainder of Yeltsin’s tenure in office.   |
| September 1996: | Secretary O’Leary and Minister Mikhailov announce a “Trilateral Initiative” with the International Atomic Energy Agency (IAEA) to put excess fissile material under IAEA monitoring. (President Clinton had committed to place U.S. excess material under IAEA monitoring as early as 1993, and President Yeltsin had said in April, 1996 that he would place the Mayak storage facility being built for Russian excess nuclear material under IAEA monitoring.) While discussions continue, more than three years later no monitoring under the Trilateral Initiative has been implemented.   |
| March 1997:     | At their Helsinki summit, President Clinton and President Yeltsin agree that a START III agreement should include “measures relating to the transparency of strategic warhead inventories and the destruction of strategic nuclear warheads,” and that transparency measures related to sea-launched cruise missiles, tactical nuclear weapons, and nuclear materials will also be explored. Three years later, as a result of the Russian Duma’s failure to ratify START II and the U.S. refusal to begin START III negotiations until START II is ratified, no negotiations have begun, and it is expected that these issues will probably be dropped from START III in the interests of getting at least an initial framework agreement before President Clinton leaves office. |

formal transparency negotiations begin.<sup>42</sup> DOE hopes to be able to establish new sites for demonstrating technologies and procedures for transparent warhead dismantlement at the two Russian nuclear weapons assembly and disassembly facilities now slated for closure, and at a comparable facility in the United States, such as the Device Assembly Facility (DAF) at the Nevada Test Site, and funding for this effort is included within the \$10 million proposed for the two Russian nuclear weapons facilities in DOE’s FY2001 budget request (see “DOE’s Proposed Long-Term Nonproliferation Initiative for Russia,” p. 70). This lab-to-lab effort, which also encompasses a number of other transparency issues, is perhaps the most promising U.S.-Russian transparency initiative now underway—but

<sup>42</sup>For a discussion, see *Warhead and Fissile Material Transparency Program: Strategic Plan*, op. cit.

here, too, souring political relations are contributing to difficulties relating to access to information and facilities.

Another informal initiative now in its early stages is the possibility of cooperation to put together data on Russia's current stockpile and historic production of weapons plutonium, comparable to the data the United States has already released.<sup>43</sup> Russian officials have indicated an interest in pulling together comparable data, and the United States sponsored a conference in Russia in which U.S. experts described for their Russian colleagues the work involved in preparing the U.S. plutonium inventory report, and the two sides discussed the work that would be involved in preparing a comparable Russian document. Open questions include whether Russia, if it did prepare such information, would be willing to make it available to the United States, and whether the United States would be willing to provide the financing needed to complete such a project.<sup>44</sup> Accomplishing a plutonium inventory data exchange through such an informal mechanism would provide a critically important precedent for additional transparency initiatives in the future, as well as laying a crucial foundation for cooperation on disposition of excess plutonium stockpiles.

Transparency arrangements for the Mayak storage facility—virtually the only formal U.S.-Russian transparency negotiation still underway as of late 1999—represent a classic example of the problems with the “pay-per-view” approach. The Russian side, while agreeing in principle from early on that in return for its assistance the United States could have access to this facility once it was built, delayed actually beginning negotiations for years on end, and has repeatedly raised the issue of the lack of reciprocity at similar U.S. facilities. This is a particular problem in this case, since under the earlier “mutual reciprocal inspections” (MRI) initiative, no longer being pursued, it was precisely this type of facility to which reciprocal access was to have been granted. Formal negotiations on Mayak transparency finally did get underway, and have largely reached agreement on the straightforward measures that would be implemented at the Mayak facility itself; but since Russia now plans to convert weapons components to metal slugs before the material is placed in this facility, the United States, to confirm that the material comes from weapons, is demanding transparency “upstream,” at the facility where this conversion would be done. The United States has suggested a variety of measures to ensure that sensitive information about weapons component design would not be revealed, and has offered to demonstrate the techniques it proposes in a joint experiment on real U.S. weapons components, but has refused to offer reciprocal Russian monitoring for large-scale weapon component conversion in the United States. The Russian side is balking on accepting these unilateral upstream transparency measures.<sup>45</sup> Whether transparency measures will be developed and in place in time for the planned opening of the facility in 2002 remains to be seen.

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<sup>43</sup> For the U.S. release, see *Plutonium: The First 50 Years*, Washington DC: U.S. Department of Energy, 1996 (available at <http://www.osti.gov/html/osti/opennet/document/pu50yrs/pu50y.html>).

<sup>44</sup> Interviews with U.S. and Russian government and laboratory officials.

<sup>45</sup> For a discussion that is critical of the Mayak storage facility because of Russia's refusal to grant this upstream transparency, see General Accounting Office, *Weapons of Mass Destruction: Effort to Reduce Russian Arsenals May Cost More, Achieve Less Than Planned*, GAO/NSIAD-99-76, Washington DC: General Accounting Office, April 1999. For a general description of the types of measurements the United States is seeking, see *Warhead and Fissile Material Transparency Program Strategic Plan*, op. cit.

In parallel, the United States and Russia are also pursuing the concept of international, rather than merely bilateral, verification for excess material, under a “Trilateral Initiative” involving the United States, Russia, and the International Atomic Energy Agency (IAEA). Under the Trilateral Initiative, the three parties are working to develop a new verification regime that would allow the IAEA to confirm that fissile material had been irrevocably removed from nuclear weapons programs—including developing approaches to allow IAEA verification of material in classified forms, such as plutonium or HEU weapons components, without revealing classified information. The verification approach would be different from traditional IAEA safeguards, as the purpose would be focused on verifying reductions from stockpiles of thousands of nuclear weapons in nuclear-weapon states, rather than verifying that enough material for a single nuclear weapon has not been diverted in non-nuclear-weapon states.

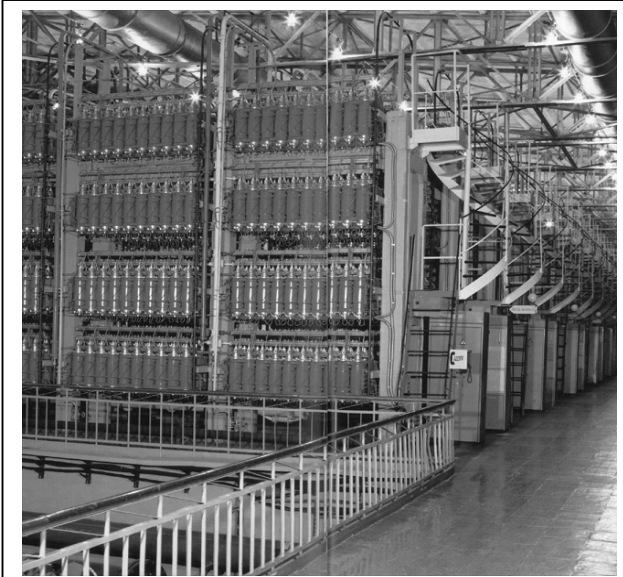
The parties have carried out a number of technical demonstrations of relevant technologies (including a successful demonstration at Los Alamos in June 1999 of instrumentation with “information barriers,” making it possible to confirm key attributes of fissile material in classified forms while blocking any classified information from being revealed to the inspector), and are working to draft a legal agreement outlining such a verification regime. Russia has indicated its intention to place the Mayak storage facility under this IAEA verification regime when the facility and the regime are both completed. At the June 1999 Board of Governors meeting, the IAEA secretariat outlined a number of options for funding such disarmament verification, including the creation of a special nuclear disarmament fund for this purpose.<sup>46</sup> Whether this initiative will come to fruition remains uncertain, however: many security concerns over having international inspectors monitoring such material have to be overcome, and funding remains a key issue that could block final agreement—not only funding for the IAEA’s costs, but also funding for Russia’s costs to host IAEA inspectors. In the meantime, as described below, the United States has been placing a modest portion of its fissile material under IAEA safeguards as part of its voluntary offer agreement with the IAEA.

Today, the only formal fissile material transparency measures actually being implemented on a substantial scale are, not surprisingly, the only ones where there was a large financial incentive to reach agreement—namely, the transparency measures for the \$12 billion U.S.-Russian HEU Purchase agreement, designed to provide confidence to the United States that the LEU it is purchasing comes from HEU which in turn comes from weapons, and confidence to Russia that the LEU it is selling is used only for peaceful purposes.<sup>47</sup> Indeed, it is worth noting that Russian agreement to the more intrusive

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<sup>46</sup> For a discussion of progress on the trilateral initiative, see “IAEA Verification of Weapons-Origin Material in the Russian Federation and the United States,” IAEA Press Release, General Conference PR 99/10, September 27, 1999 (available at [http://www.iaea.org/GC/gc43/gc\\_pr/gcpr9910.html](http://www.iaea.org/GC/gc43/gc_pr/gcpr9910.html)); see also Schiefer and Shea, “IAEA Perspectives,” *op. cit.*

<sup>47</sup> The specific transparency measures being implemented include: occasional U.S. observation of measurements of containers said to hold HEU components of dismantled weapons, to confirm the presence of HEU with a U-235 content of at least 90%; occasional U.S. observation of the oxidation of metal shavings produced from these weapons components; checking of tags and seals of containers holding purified HEU after shipment to the blending facility; continuous monitoring of the flow of HEU, blend-stock, and blended material at the blending facility, with permanent U.S. presence there; and copying and review of material accounting records provided by the Russian side. Russia is able to observe the



Transparency measures for the U.S.-Russian HEU Purchase Agreement include a permanent U.S. presence at the uranium enrichment plant at Novoural'sk (formerly Sverdlovsk-44), shown above. Transparency for the HEU deal—where there was a large financial incentive to reach agreement—is the only large-scale formal U.S.-Russian transparency initiative for warheads or fissile material that are being successfully implemented. Source: DOE

aspects of these transparency measures was gained by using the leverage provided by Russia's need for large cash pre-payments to provide the funding needed to carry out the operations to provide the LEU under the deal. For whatever reason, the United States government has never attempted to apply the basic lesson that transparency success requires there to be some incentive for the Russian side to reach agreement to its broader transparency objectives.

In short, if the objective is only to create one or two “transparency islands” relating to specific projects, such as the HEU Purchase Agreement and the Mayak Storage Facility, a large fraction of what is needed—perhaps 80 percent—is either already being implemented or at least under negotiation, as shown in Figure 1. But

if the objective is to create a “sea of transparency” with only a few remaining “secrecy islands”—that is, to build the kind of comprehensive transparency regime that would be needed to help ensure security and provide a basis for deep reductions in nuclear warhead and material stockpiles—then the effort has barely begun: 5 percent or less of what would be needed can realistically be said to be underway.

processing of the LEU delivered to the United States at USEC's enrichment plant, and fabrication of that LEU into reactor fuel at U.S. fabrication sites. As additional blending facilities have been added more rapidly than transparency measures for each facility could be negotiated and implemented, the most complete measures are so far only being implemented at the original blending facility, but are planned to be implemented at the others in the future. Because of this lack of complete implementation at the newer blending facilities, and because there is not a complete “chain of custody” with tags, seals, and monitoring ensuring continuity of knowledge throughout the entire process, there remain some skeptics who argue that there are possible ways to defeat the transparency regime and provide HEU that did not come immediately from weapons components, or even LEU that was not blended from HEU. Given the wide range of information available to the United States at different points in this chain, however, and given the minor to nonexistent incentives for Russia to provide material other than what has been agreed to, and the enormous financial risks to Russia of being caught violating the deal, there appears to be good reason for confidence that the LEU being purchased is in fact blended from HEU, most of which came from dismantled weapons. A brief discussion of these measures can be found in Janie Benton, et. al., “U.S. Transparency Monitoring Under the U.S./Russian Intergovernmental HEU-LEU Agreement,” in *Proceedings of the Institute of Nuclear Materials Management, 40th Annual Meeting*, Phoenix, AZ, July 25-29, 1999; see also *Nuclear Proliferation: Status of Transparency Measures for U.S. Purchase of Russian Highly Enriched Uranium*, GAO/RCED-99-194., Washington DC: General Accounting Office, September 1999. (Unfortunately, some of the more interesting transparency arrangements are the ones involving attempts to build confidence that the HEU came from weapons, which are not treated in the unclassified version of the GAO report.)