

**The Next Wave:
Urgently Needed
New Steps To
Control Warheads
and Fissile Material**

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foster sustainable employment for the roughly 50,000 people that MINATOM has indicated will need new jobs. The 50,000 figure is itself in all likelihood a substantial underestimate.⁴⁰ By agreement between the United States and Russia, the initial efforts focus on three priority cities—the two weapons laboratories (Sarov, formerly Arzamas-16, and Snezhinsk, formerly Chelyabinsk-70) and one of the plutonium production cities (Zheleznogorsk, formerly Krasnoyarsk-26). As Russia has recently announced that it plans to close two of its four nuclear weapons assembly/disassembly facilities (the Avangard plant located at Sarov, and the plant at Zarechniy, formerly Penza-19), DOE has proposed funding to help facilitate shut-down of these facilities and re-employment of their staff as well.

NCI has launched a number of commercialization and community-building programs in the nuclear cities. An Open Computing Center has been established in Sarov (with a similar center planned to open in 2000 in Snezhinsk), allowing computer experts from the weapons design laboratories to work on software development contracts for Western or Russian firms, at unclassified centers outside the nuclear weapons laboratories themselves. (As part of the agreements to establish these centers, U.S.-supplied high-speed computers that Russia had obtained without the proper export licenses are being moved from the weapons design labs to these open, unclassified centers, largely resolving any concerns that these computers might be used for weapons design.) An International Development Center has been established in Zheleznogorsk—with similar centers planned in Sarov and Snezhinsk—to foster development of private business in the town, by providing training and strategic planning services to businesses, helping the town government carry out economic development initiatives, and helping business make contact with potential sources of financing. NCI has also provided the initial funding necessary to allow businesses in the three initial priority cities to compete for the \$300 million in small-business loans for Russia available from the European Bank for Reconstruction and Development (EBRD). A wide range of other specific projects are being explored or implemented—but the challenge is huge, the effort is only just beginning, and the resources provided to date are woefully inadequate to the task.

In short, as noted in Figure 1, if the problem is conceived of as providing short-term non-weapons opportunities that top weapons scientists can take if they so choose, a case can be made that programs currently under way are addressing a substantial fraction of the problem, perhaps 80 percent or more, at least in the nuclear area. But if the problem is conceived as achieving sustainable economics in a greatly downsized Russian nuclear complex that would pose less threat to the United States, the effort has barely begun—perhaps 10 percent of what would be needed to achieve that goal is now included in agreements and budget plans.

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

⁴⁰ *Report to the Congress on the Nuclear Cities Initiative*, reprinted in *Nuclear Cities Initiative: Status and Issues*, op. cit.

cooperation on security and accounting, and for deep reductions in nuclear warhead and material stockpiles.⁴¹ 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

⁴¹ 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:

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.⁴² 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

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

Monitoring Stockpiles and Reductions

The ultimate goal of U.S.-Russian transparency efforts should be an integrated, comprehensive regime that would provide confidence that each side was reducing its total nuclear warhead and fissile material stockpiles to low levels, and that these stockpiles were safe and secure.²⁷ With U.S.-Russian relations as they are in the wake of the bombing of Yugoslavia, however, that goal is a long way off; U.S.-Russian political tensions and renewed concerns over protecting nuclear secrets on both sides are likely to make near-term progress on nuclear transparency extraordinarily difficult. Paradoxically, it appears that the best hopes would be for initiatives that were either very large (so that they might have some chance of addressing Russian security concerns and shifting the political environment in favor of cooperation) or very small (so that they could be pursued informally without drawing undue political attention in either country). A few of the steps that should be pursued are listed below.²⁸

NUCLEAR MATERIAL STOCKPILE DATA EXCHANGES

Achieving a better understanding of the actual quantities, forms, and locations of fissile material in each country is fundamental to cooperative efforts to secure, monitor, and reduce these dangerous stockpiles. The United States has openly published data on its plutonium stockpile and plutonium production, and is preparing to publish similar data concerning its HEU stockpile. As noted in Section III, preliminary U.S.-Russian discussions suggest that it may be possible to work out an informal arrangement under which Russia would provide data on its plutonium stockpile comparable to the data the United States has already published on its own stockpile, and the United States would provide the funding Russian experts need to compile the data. This informal approach, if successful, could then be applied for HEU inventories, once the United States releases that data. This would provide a rapid means to accomplish a substantial part of the stockpile data exchange agreed to by Presidents Clinton and Yeltsin in 1994 on a contracting basis, without requiring high-level formal negotiations that would draw widespread political attention. The cost would likely be only a few million dollars.

INTERNATIONAL MONITORING OF EXCESS FISSILE MATERIAL

A key issue in the U.S.-Russian-IAEA "Trilateral Initiative" described in Section III is who will pay the costs of monitoring materials in Russia. (To date, the United States has been paying both its own costs and the IAEA's costs of monitoring the small amount of excess material that is under IAEA verification so far in the United States.) Russia is very unlikely to be able or willing to provide the funding to pay these costs, a

²⁷ See, for example, discussion in *Management and Disposition of Excess Weapons Plutonium*, op. cit.

²⁸ For an excellent recent discussion of transparency measures, with some similar suggestions, 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 (available at <http://www.princeton.edu/~ransac>).

problem that could stop the initiative in its tracks. The IAEA has proposed the creation of a special disarmament fund to pay for such costs, which might ultimately receive funds from mandatory assessments; the United States could kick-start the effort with an initial voluntary contribution to the fund, and could agree to pay for Russia's costs to host the IAEA inspections (a cost category very unlikely to be covered by an international fund). U.S. agreement to pay these costs could enable a significant nonproliferation and disarmament initiative to go forward, at a very modest cost (probably a few million dollars per year initially, and less after the arrangement is established).



In a lab-to-lab effort, U.S. and Russian weapons scientists are jointly developing transparency technologies and procedures to confirm the dismantlement of nuclear weapons without revealing classified information. The United States should offer a reciprocal initiative under which thousands of U.S. warheads would be placed in secure storage open to Russian monitoring, and committed to eventual dismantlement, if Russia agrees to do the same with thousands of its own warheads. As part of the package, the United States should also offer to provide financial help for warhead dismantlement in Russia, with reciprocal transparency to confirm the dismantlement. Source: DOE

A MAJOR TRANSPARENT WARHEAD REDUCTIONS OFFER, WITH ASSISTANCE FOR TRANSPARENT WARHEAD DISMANTLEMENT

With the current state of U.S.-Russian relations, there is very little chance that the START II treaty will be ratified and formal negotiations completed on a START III treaty incorporating the unprecedented transparency measures for the dismantlement of warheads envisioned in the Helsinki statement of 1997 before President Clinton leaves office. Even in the unlikely event that a framework agreement on START III and national missile defenses can be achieved by the end of President Clinton's term, dismantlement transparency measures are likely to be postponed or included

only as initial small-scale demonstrations. Informal reciprocal-unilateral initiatives—such as those launched by President Bush and Soviet President Gorbachev in 1991, which resulted in the pull-back and dismantlement of many thousands of nuclear weapons, without requiring formal negotiations—represent the only near-term hope for a breakthrough in transparent nuclear arms reductions. To gain acceptance on both sides in the current political environment, such an initiative would have to address concerns each side has about the other's nuclear stockpile. For example, President Clinton could offer to place a large fraction of the U.S. strategic reserve and tactical nuclear warheads (stockpiles unregulated by arms control to date, and which will represent the vast majority of the total U.S. warhead stockpile under START II) in secure storage open to Russian monitoring, and commit them to verifiable dismantlement (with specific procedures to be worked out later), if Russia would do the same with its comparable warhead stockpiles. This could address Russian concerns about the U.S. maintenance of a large stockpile of reserve strategic warheads that could be rapidly returned to missiles, and U.S. concerns

about the huge Russian tactical warhead stockpile. Within a few months, the majority of all the warheads in both sides' nuclear arsenals could be under reciprocal monitoring, and committed to dismantlement.²⁹ Indeed, technology exists that would make it possible to permanently and verifiably disable these warheads, pending their eventual dismantlement, rather than only subjecting them to monitoring.³⁰ As part of this package, the United States could offer to provide financial assistance for warhead dismantlement (e.g., \$90 million per year for a dismantlement rate of 3,000 per year, or roughly \$30,000 per warhead) in return for Russian agreement to a transparency package that would also be implemented reciprocally at the Pantex dismantlement facility in the United States. The transparency measures would have to be designed jointly by U.S. and Russian experts, to give both sides confidence that while the measures could help confirm that dismantlement was taking place, they would do so without revealing sensitive information or unduly interfering with maintenance of each side's nuclear stockpile. As noted earlier, preliminary U.S.-Russian lab-to-lab work in designing such measures is already under way; U.S. experts have already produced reports on the impact of a variety of dismantlement transparency approaches at U.S. facilities, and it would make sense for the United States to help finance a Russian effort to do the same with respect to Russian facilities.³¹

Ending Further Production

As discussed in Section III, while the program to convert Russia's remaining plutonium production reactors has faced mounting safety, nonproliferation, cost, technical, and schedule issues, there may now be an opportunity to pursue a superior approach—shutting these reactors down and providing other sources of heat and power to replace them. If this can in fact be accomplished at comparable cost and in a comparable time, such a shut-down-and-replacement strategy would better serve both the nonproliferation objectives and the safety objectives held by both sides. Indeed, this was the approach originally favored by both parties, and called for in the 1994 agreement; it was only doubts about its cost that drove the parties in the direction of conversion.

The United States should provide the funding necessary for a new, in-depth examination of least-cost possibilities for replacing the heat and power provided by these nuclear reactors. Both cities have partially completed fossil fuel plants, and as the Ministry of Atomic Energy suggests, completing some coal and oil-fired plants and expanding others may turn out to be the cheapest approach. Other possibilities should also be examined, however. Seversk is in a region with substantial supplies of natural gas, and if a pipeline can provide gas to the town at reasonable cost, a combined-cycle gas

²⁹ For a description of this concept, see Matthew Bunn, "Act Now, Mr. President," *Bulletin of the Atomic Scientists*, March/April 1998. For a similar proposal applying to active-duty strategic forces, see Admiral Stansfield Turner, *Caging the Nuclear Genie: An American Challenge for Global Security*, Boulder, CO: Westview Press, 1997. See also Committee on Nuclear Policy, *Jump-START: Retaking the Initiative to Reduce Post-Cold War Nuclear Dangers*, Washington DC: Henry L. Stimson Center, February 1999 (available at <http://www.stimson.org/policy/jumpstart.htm>).

³⁰ See Matthew Bunn, "'Pit-Stuffing': How to Disable Thousands of Warheads and Easily Verify Their Dismantlement," *F.A.S. Public Interest Report*, March/April 1998.

³¹ See discussion in Luongo and Bukharin, "U.S.-Russian Warhead Dismantlement Transparency," *op. cit.*