

# CONTROLLING NUCLEAR WARHEADS AND MATERIALS: AN UPDATE

Matthew Bunn and Anthony Wier  
Harvard University  
79 JFK Street  
Cambridge, MA 02138 USA 617/495-9916

## ABSTRACT

This paper provides a summary and update of the key points in *Controlling Nuclear Warheads and Materials: A Report Card and Action Plan*.<sup>1</sup> The paper attempts to outline the key steps that must be taken to keep nuclear weapons and materials from being stolen and falling into the hands of terrorists and hostile states; outlines rough metrics for judging how much progress has been made in accomplishing those steps, in six broad categories of effort; provides an assessment of the progress of current programs in these areas, using these metrics; and makes recommendations for accelerated and expanded actions by the U.S. government and other governments to address these threats. The paper also describes the ongoing project to improve and update these assessments and recommendations, and the additional supporting information available in a major new web site of the same title.

## INTRODUCTION

The single highest priority for the homeland security of the United States – and of all nations – is to prevent and defend against catastrophic terrorist attacks using weapons of mass destruction (WMD). Nuclear weapons are fundamentally different from chemical and biological weapons, in that their essential ingredients – plutonium or highly enriched uranium (HEU) – do not occur in nature, and producing them is beyond the plausible capabilities of terrorist groups. Hence, if the existing stockpiles of nuclear weapons and weapons-usable nuclear materials can be reliably guarded and prevented from falling into terrorist hands, nuclear terrorism can be reliably prevented: no material, no bomb.

A successful attack with a nuclear explosive would be more difficult for terrorists than a chemical, biological, or radiological attack, but the massive, assured, instantaneous, and comprehensive destruction of life and property that a nuclear weapon would cause may make this route a priority for terrorists. The same measures needed to keep nuclear weapons and materials out of the hands of terrorists would also contribute to keeping them out of the hands of hostile states – whose nuclear weapons ambitions could be achieved far more rapidly if they could get stolen nuclear weapons or the materials to make them.

In short, cooperative threat reduction programs designed to secure, monitor, and reduce nuclear weapons and materials should be seen as a fundamental part of U.S. homeland security. Homeland security begins abroad – wherever an insecure facility houses weapons-usable nuclear material. As Senator Richard Lugar has said, the war on terrorism will not be won until all the world's stockpiles of weapons of mass destruction and their essential ingredients are secured and accounted for, to stringent standards.<sup>2</sup>

This perspective formed the background for the recent report, *Controlling Nuclear Warheads and Materials: A Report Card and Action Plan*.<sup>3</sup> That report (together with its detailed on-line companion, available at <http://www.nti.org/cnwm>) attempted to provide, in one source, an overall assessment of:

- *The threat*, combining terrorists' interest in, and capabilities related to nuclear explosives, the current state of security for nuclear weapons and materials around the world, along with known thefts or attempts to steal these materials;
- *Current programs to reduce the threat*, including a first-ever attempt to lay out a comprehensive set of metrics for judging how much of the job of blocking the terrorist pathway to the bomb has been accomplished, across six broad categories of effort; and
- *A comprehensive, integrated action plan* for further steps to reduce the threat of nuclear theft more quickly and comprehensively.

With the resources of a group of three authors at one university, this report could not be anything more than a first cut – a contribution to and a framework for what we hope will be a continuing debate. In particular, the report provided an American perspective, focused primarily on programs the United States has funded and steps the U.S. government should take. But it is clear that to succeed, a comprehensive plan for this mission must be developed not as a made-in-America effort, but in full partnership with Russia and the other states that must take part. And it is equally clear that while the United States has a special responsibility to lead, the threat is a threat to all nations, not just to the United States, and other nations around the world must contribute to its solution as well.

## KEY FINDINGS

Our examination of the threat of nuclear weapons terrorism, the progress that has been made so far in addressing that threat, and the opportunities for further action leads us to four key findings, and recommendations in seven areas.

*Key Finding 1: The threat that terrorists could acquire and use a nuclear weapon in a major U.S. city is real and urgent.*

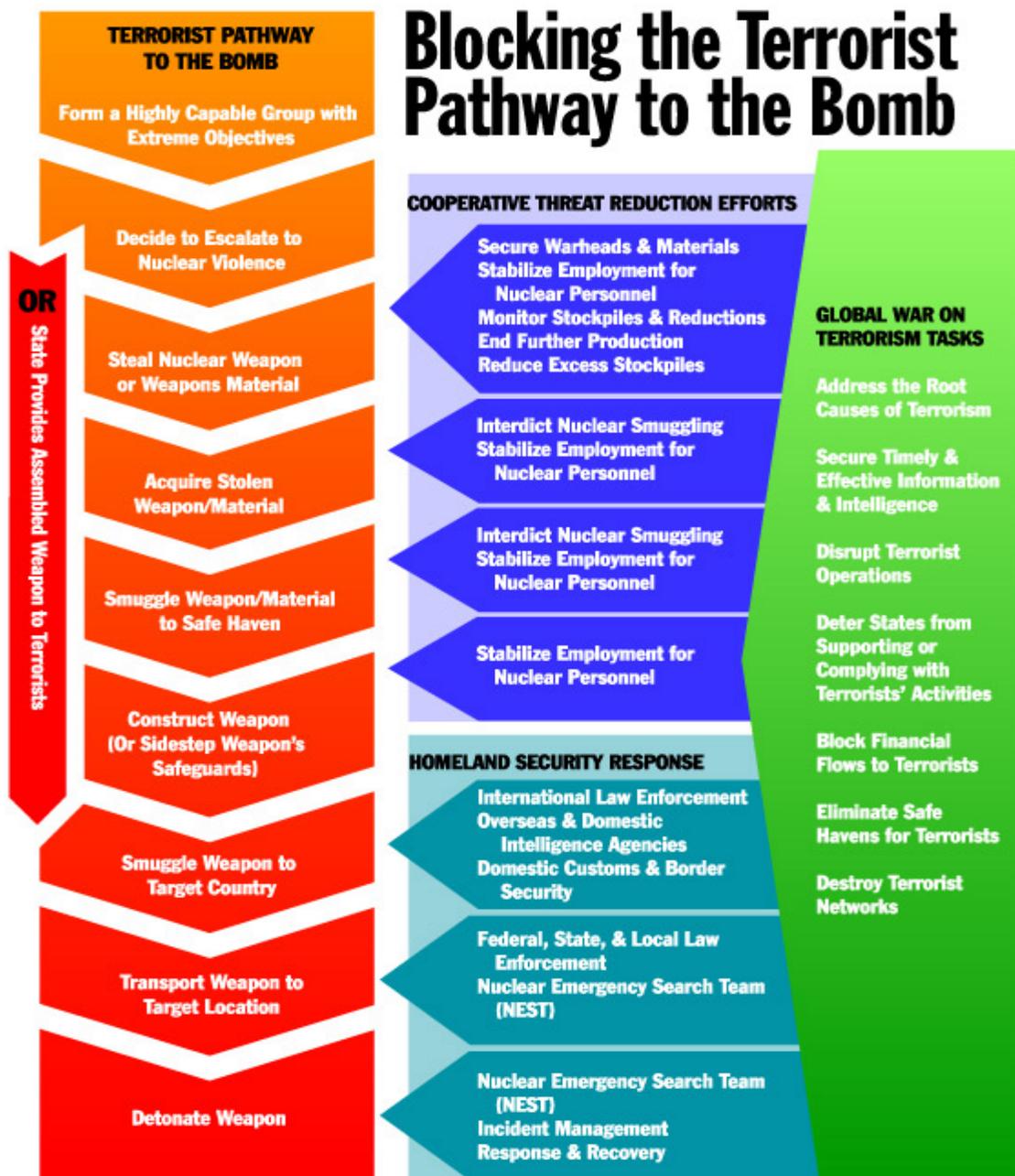
For at least a decade, Osama bin Laden and his al Qaeda terrorist network have been attempting to get stolen nuclear weapons or nuclear materials and the nuclear expertise to make a bomb. Detailed analysis of the nuclear documents recovered in Afghanistan, and of other evidence, suggests that, had al Qaeda not been deprived of their Afghanistan sanctuary, their quest for a nuclear weapon might have succeeded within a few years – and the danger that it could succeed elsewhere still remains.<sup>4</sup>

With enough HEU, a simple “gun-type” bomb of the kind that destroyed Hiroshima could potentially be well within the capabilities of a large and sophisticated group such as al Qaeda; even a crude implosion device from plutonium cannot be ruled out<sup>5</sup> – particularly if al Qaeda succeeded in recruiting nuclear expertise, as it has repeatedly attempted to do.<sup>6</sup> The damage wrought in economic, political, social, and humanitarian terms by just one successful attempt to construct and deliver such a device would be incalculably high.

Unfortunately, tens of thousands of nuclear weapons and many hundreds of tons of weapons-usable nuclear material exist in countries around the world, with standards of security that range from excellent to appalling. The huge stockpiles in the former Soviet Union – whose security system was designed for a world that no longer exists – pose a particular problem, but the problem of potential theft of weapons-usable nuclear material is a global one, not limited to the former Soviet states.<sup>7</sup> For example, many of the more than 130 HEU-fueled research reactors around the world have little more security on-site than a night watchman and a chain-link fence. Particular countries where the threat is high pose special grounds for concern. In Pakistan, for example, there is widespread sympathy for the Taliban and for extreme Islamic causes within the nuclear weapons establishment – as evidenced by the case of the two nuclear weapon scientists who traveled to Afghanistan, met with bin Laden, and discussed nuclear weapons.<sup>8</sup> At the same time, there are large armed remnants of al Qaeda operating in Pakistan. The possibility of a large terrorist attack on a Pakistani nuclear weapons site, possibly with help from insiders, cannot be ruled out.

As a result of such conditions in countries around the world, there have been multiple documented cases of real theft of kilogram quantities of real weapons-usable nuclear material. The International Atomic Energy Agency has a database that includes 18 incidents involving seizure of stolen HEU or plutonium that have been confirmed by the relevant states. To cite just one example, in 1998 there was a conspiracy by insiders at one of Russia’s largest nuclear weapons facilities to steal 18.5 kilograms of HEU – potentially enough for a nuclear bomb at a single stroke. Fortunately, Russian officials report that the conspirators were caught before the material left the facility.<sup>9</sup> Russian official sources confirm four incidents of Chechen terrorists – who have close ties to al Qaeda – carrying out reconnaissance on storage sites or transport trains for Russian nuclear warheads in 2001–2002.<sup>10</sup> Theft of the essential ingredients of nuclear weapons is not a hypothetical worry – it is an ongoing reality. What we do *not* know is how many of these thefts have *not* been detected – how many horses have already left the barn.

Figure 1



*Key Finding 2: The most effective approach to reducing the risk is a multi-layered defense designed to block each step on the terrorist pathway to the bomb. But securing nuclear weapons and materials at their source is the single most critical layer of this defense, where actions that can be taken now will do the most to reduce the risk of terrorists acquiring nuclear weapons and materials, at the least cost.*

Threat-reduction programs designed to improve controls over nuclear weapons, materials, and expertise; homeland security efforts; and the war on terrorism each have critical roles to play in blocking the terrorist pathway to the bomb. This is illustrated in Figure 1, which highlights the steps on that pathway and the programs that may be able to interdict those steps. While a multilayered defense is needed, the most critical choke-point on the pathway is in preventing nuclear weapons and materials from being stolen in the first place. Once a nuclear weapon or the material to make one has been stolen and is beyond the gates of the

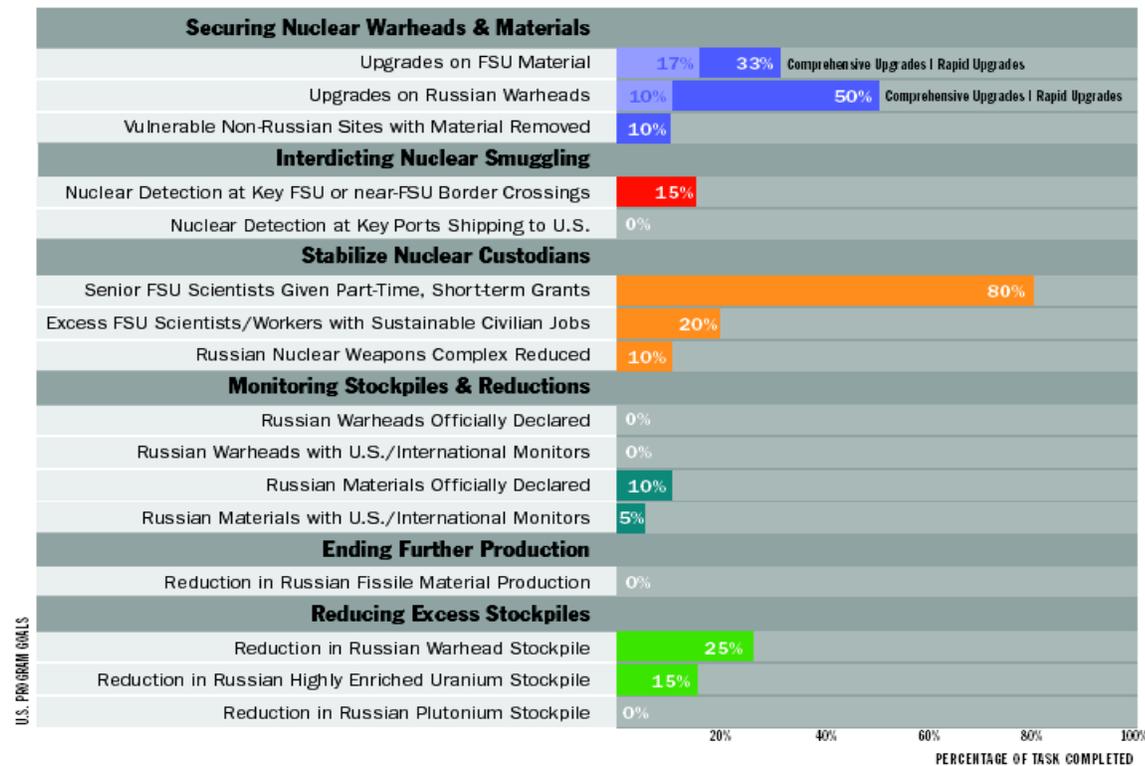
facility where it was supposed to be, it could be anywhere – and finding and recovering it, or blocking it from being smuggled to a terrorist safe haven or into a target country, becomes an enormous challenge.

*Key Finding 3: Current programs designed to reduce the threat of nuclear weapons or materials falling into terrorist hands are making headway, but have finished much less than half the job in virtually every category, and the pace of progress is unacceptably slow. There is a substantial gap between the urgency of the threat and the pace and scope of the current response.*

We examined both inputs to current programs – ranging from the time and energy of senior political leaders to the requested and appropriated budgets – and the outputs, measured by what fraction of various parts of the job of controlling nuclear warheads, materials, and expertise has been accomplished, and the pace at which the rest of job is being done. This examination was complicated by the fact that no integrated plan for these efforts exists, setting out all the work that needs to be done. Likewise, there is no comprehensive, quantitative report on how much has been progress has been made by all the government entities involved.

In each of the critical inputs to the effort we examined – political leadership, organization and planning, information, and resources – much more can and should be done to address the threat of terrorists getting nuclear explosives than is now being done. The sustained, intensive effort directed from the highest levels of government that has been focused on Iraq in the last year demonstrates how the government behaves with respect to an issue that is genuinely considered a top priority for U.S. national security. The level of sustained high-level political attention and resources devoted to keeping nuclear weapons or materials from being stolen and falling into terrorist hands – arguably an even more urgent threat to U.S. national security – has not been remotely comparable.

**Figure 2 – Controlling Nuclear Warheads and Materials:  
How Much Work Has Been Completed?**



In terms of *output*, it is clear that existing programs to improve controls over nuclear weapons, materials, and expertise have made significant progress. Hundreds of tons of potential bomb material and thousands of nuclear weapons are demonstrably more secure; enough nuclear material for thousands of nuclear weapons

has been permanently destroyed; and thousands of under-employed nuclear weapons experts have received support for redirecting their talents to civilian work. These efforts have represented an extremely cost-effective investment in the security of the United States, Russia, and the world.

But whether progress is measured by the fraction of potentially vulnerable nuclear warheads and materials secured, the fraction of the excess stockpiles destroyed, or the fraction of unneeded nuclear weapons experts and workers provided with sustainable civilian employment, much less than half the job has been done. Figure 2 provides a summary of our estimates of what fraction of the job had been accomplished as of the end of Fiscal Year (FY) 2002, across the spectrum of efforts to control nuclear warheads, materials, and expertise. As can be seen, in most cases, the fraction of the mission accomplished was at that time between zero and one-third<sup>11</sup> – and the rate at which further progress was being made remained far below the urgency of the threat. In short, the U.S. government remains far from meeting the standard President Bush correctly set out in his 2003 State of the Union address – doing “everything in our power” to ensure the “day after” a terrorist nuclear attack never comes.<sup>12</sup>

This is not a critique of the thousands of people who have worked unbelievably hard over the last decade to move this agenda forward. Nor is it primarily a critique of the Bush administration, as we made much the same criticisms of the Clinton administration. Indeed, the Bush administration deserves credit for launching the G-8 Global Partnership Against the Spread of Weapons and Materials of Mass Destruction, among other initiatives, and Secretary of Energy Spencer Abraham and National Nuclear Security Administrator Linton Brooks, among others, have labored hard and ably to move this agenda forward. Rather, this is a critique of a system and a structure, a structure that lacks any overall leader for these efforts, and any institutional focal point for moving them forward. As long as that structural problem remains, the forces of inertia and business as usual will be extraordinarily difficult to overcome, and the gap between threat and response is not likely to be closed.

*Key Finding 4: Opportunities exist for new initiatives and steps to strengthen and accelerate existing efforts, which, if fully implemented, could rapidly and dramatically reduce the risk.*

The report offers dozens of recommendations for accelerated, expanded, and strengthened action to control nuclear warheads and materials, covering all six substantive areas identified in Figure 2, as well as cross-cutting steps. While there are many obstacles to progress, they are largely political, not technical barriers, and we believe that with a sustained effort from the highest levels of the U.S. government and other governments, they could be overcome – and the risk of nuclear weapons terrorism drastically reduced within a few years. We do not pretend that our recommendations represent a perfect plan (indeed, any plan will require flexibility to adapt to changing obstacles and opportunities); we would like nothing better than for the government to respond to our suggestions with a plan of their own that they argued would get the job done better and faster.

## SELECTED RECOMMENDATIONS

A few of the most urgent initiatives we recommended are described below:

- **A top-priority, comprehensive, integrated effort.** Given the crucial importance of this issue to U.S. homeland security, it requires sustained, top-priority attention from the White House – not just occasional encouraging statements, but in-depth, day-to-day engagement. If even a twentieth of the effort and resources devoted to Iraq in the last year were devoted to ensuring that all stockpiles of nuclear weapons and weapons-usable nuclear materials around the world were secure and accounted for, we are optimistic that the job could be accomplished quickly. The record of past arms control efforts is clear: where the President is personally and deeply involved in pushing them forward, such efforts succeed; where he is not, they fail. If there were intensive, sustained leadership focused on this mission from the highest levels of the U.S. government; a single senior leader in the White House with full-time responsibility and accountability for leading the effort; an integrated and prioritized plan to accomplish the goal; and an effectively functioning global coalition of nations working together to keep nuclear weapons out of terrorist hands, all the rest of what needs to be done – including the application of the

resources needed to do the job – would follow. Putting in place those key elements of a comprehensive approach, therefore, is our highest priority recommendation.

- **An accelerated effort with Russia – with a joint target date for completion, a partnership-based approach, and a new approach to the access problem.** We recommended that President Bush push hard for agreement with President Putin on an accelerated, partnership-based approach to improving security and accounting for Russia’s immense stockpiles of nuclear weapons and materials, making this a central priority in the U.S.-Russian relationship. The push must be at the Presidential level, as only Putin and Bush are likely to be able to overcome the disputes over access to sensitive facilities and the myriad bureaucratic problems in both Moscow and Washington that have been allowed to slow progress.<sup>13</sup> It must focus on a genuine partnership, with Russian experts involved at all levels of the conception, design, and execution of the effort, because that is the only way to achieve the level of on-the-ground cooperation needed for successful acceleration, and the only way to achieve the Russian “buy-in” so crucial for sustainability. We believe the two Presidents should identify this cooperation as a top priority for both countries’ national security; jointly set a target date of 2 years for completing “rapid upgrades” or “quick fixes” for all nuclear weapons and weapons-usable nuclear materials, and 4 years for completing comprehensive upgrades; agree that Russia will permit greatly expanded access to sensitive facilities, the United States will offer Russian access to comparable facilities in the United States, and the two sides will quickly develop and implement an agreed approach to assuring that U.S. taxpayers’ funds are being spent appropriately at sites too sensitive for either side to permit access; and agree to designate a senior official responsible for identifying and overcoming obstacles to this accelerated effort (including bringing them to the Presidents if necessary). Such an accord should be a central focus of the planned September Bush-Putin summit.
- **A fast-paced “global cleanout” initiative, designed to remove weapons-usable nuclear material entirely from the world’s most vulnerable sites.** We recommended that the United States establish a single office with the mission of removing weapons-usable nuclear material from vulnerable sites around the world as rapidly as possible, with all the authority, resources, and expertise needed to carry out that mission – including offering incentives targeted to the needs of each facility to convince them that it is in their interest to give up their nuclear material. While the United States has many key parts of such an effort already underway, they are scattered in different programs, and gaps in the effort remain. With an integrated, mission-oriented effort funded at perhaps \$50 million a year, many of the sites around the world posing the greatest threats could be eliminated within a few years.<sup>14</sup>
- **An intensive effort to forge nuclear security partnerships with other key nuclear states.** We recommended an intensive effort to work with states such as Pakistan, India, and China to ensure that of their nuclear stockpiles were secured and accounted for to standards adequate to address the threat that exists in each of those countries. Clearly, the approach to cooperation will have to be adapted to the circumstances of each country; the Nunn-Lugar model cannot simply be copied without adjustment.
- **A new initiative to secure, monitor, and dismantle the most dangerous warheads.** Tactical warheads – which in some cases are more portable, more forward-deployed, and less protected against unauthorized use than strategic warheads – and particularly warheads not equipped with modern, difficult-to-bypass electronic locks, pose a particular danger of nuclear theft. We recommended that President Bush improve on a page from his father’s playbook, launching a new initiative to control these weapons that would draw on the 1991 Bush-Gorbachev initiatives, but add a monitoring component. In this concept, each side would agree to put thousands of nuclear warheads not needed for its military requirements – including all warheads not equipped with modern electronic locks or equivalent means to prevent unauthorized use – in secure storage facilities, and open those facilities to monitoring by the other side. Each side would commit that these warheads would be verifiably dismantled as soon as agreed procedures to do so without compromising sensitive design information had been jointly developed – and that the weapons-usable nuclear material from dismantling these weapons would also be stored in secure facilities with joint monitoring. If such a unilateral-reciprocal initiative were accepted

by both sides, within a matter of months, thousands of Russia's most dangerous warheads might be under jointly monitored lock and key, and committed to eventual dismantlement – an incalculable benefit for U.S. security (at the modest cost of giving up a portion of the planned U.S. responsive force).

### UPDATING THE PICTURE

Since our report was written, there have been a number of encouraging developments. As a result of the hard work of thousands of people involved, a wide range of programs have continued to make progress in addressing this threat – the bars in Figure 2 are inching across the grey space. The material protection, control, and accounting program in particular appears to be on track to complete comprehensive upgrades this fiscal year on more than twice as much nuclear material as last year – though still at a pace that would have to be greatly accelerated to meet the program's goals. President Bush and senior officials of his administration continue to emphasize the importance of keeping weapons of mass destruction out of terrorist hands. Russian President Vladimir Putin has also emphasized the urgency of addressing this threat – and the continuing growth of Russia's economy would provide the needed resources for Russia to address many of the problems within Russia itself, if the Russian government gave these issues the priority they deserve. Secretary of Energy Spencer Abraham and Minister of Atomic Energy Alexander Rumiantsev have continued their in-depth engagement, struggling to overcome the obstacles to accelerating these efforts. Some \$18 billion toward the \$20 billion ten-year target has been pledged to the G-8 Global Partnership Against the Spread of Weapons and Materials of Mass Destruction established at the Kananaskis summit in June, 2002, additional countries have joined that effort, and some initial projects are underway. The Bush administration has challenged a policy inherited from past administrations and has pushed for a real expansion of the resources available to the IAEA. These efforts continue to draw support and new allies on Capitol Hill; this year, for example, Rep. Curt Weldon and a group of other lawmakers introduced a bill calling for a substantial expansion of programs focused on securing warheads and materials, some of which is attached to the House version of the defense authorization bill (though with the funding included in the original version largely eliminated). A new U.S.-Russian agreement on shutting down Russia's remaining plutonium production reactors has been signed, and contractors to oversee the work selected.

But there are negative trends as well:

- Despite the rhetorical emphasis on keeping WMD out of terrorist hands, there continues to be little sustained, in-depth engagement from the President and his closest advisors in moving these efforts forward; no significant push in these areas was on the agenda for the May 2003 Bush-Putin summit, for example.<sup>15</sup>
- While the U.S. government is placing only modest high-level priority on moving these programs forward, other governments are placing this agenda still lower on the priority list. The G-8 Global Partnership is not focusing its efforts on improving security for nuclear warheads and materials, but on other projects that, while worthwhile, will have much less immediate benefits for addressing the nuclear terrorist threat. And despite its name, the Global Partnership continues to focus for the time being only on projects in Russia, with projects in other countries kicked down the road. While the recent G-8 summit issued a strong statement on nonproliferation, it contained no new concrete actions to address the threat.<sup>16</sup>
- Russia continues to under-invest in nuclear security, and Russia and the United States have so far failed to overcome the access problems that are the largest single obstacle to accelerated progress in many of these efforts, or to build a genuine partnership in addressing these issues. As a result, the actual progress on the ground in many of these programs continues to be eked out inch by inch.
- The principal focus of efforts to prevent nuclear weapons terrorism continues to be on confronting hostile states that might have a connection to terrorists, and on the extremely difficult challenge of detecting materials or weapons as they are being smuggled into the United States – rather than on more cost-effective approaches focused on securing at their sources the vast existing stockpiles of weapons and materials into which terrorists might tap.
- The Bush administration has allowed much of the high-level attention that *has* been focused on this agenda in recent months to be sucked into an obscure dispute over liability provisions in threat reduction

agreements – a dispute that could lead to the termination of the Nuclear Cities Initiative when its agreement expires in September, and is continuing to interfere with work on plutonium disposition (despite the fact that support for former weapons scientists and disposition of excess plutonium were both identified as among the four priority topics for the Global Partnership).<sup>17</sup>

- The Bush administration has terminated efforts to improve security at operational tactical nuclear warhead sites in Russia – some of the sites that may pose the greatest risk of theft of an actual nuclear weapon – to avoid possibly contributing in some small way to Russia’s operational nuclear capabilities.<sup>18</sup> In other words, Russian operational nuclear capabilities pose so little threat to the United States that we can have a strategic arms reduction agreement with no verification provisions at all, but so much of a threat to the United States that we should leave Russia’s nuclear weapons more vulnerable to falling into the hands of terrorists to avoid increasing those Russian capabilities. This policy can most charitably be described as incoherent.
- Some in Congress continue to seek to tie these efforts in knots with needless and impractical certification and reporting requirements, while offering little that would actually accelerate the reduction of the real threat posed to the country. The House version of the FY 2004 defense authorization bill, for example, would prohibit spending more than 35% of the cost of a threat reduction project until the project had acquired all the permits it would ever need – even though, under Russian law, in many cases operational permits cannot be granted until construction is completed.

In short, no government is giving this agenda the priority it requires, and as a result progress in reducing this urgent threat remains slower than it needs to be. Meanwhile, a continuing stream of attacks and intelligence analyses makes clear that al Qaeda is regrouping, recruiting and training new operatives, and still seeking to carry out catastrophic attacks on the United States and other countries. The question remains: on the day after a terrorist nuclear attack, what will we wish we had done to prevent it? And why aren’t we doing that now?

## AN ONGOING EFFORT

As noted at the outset, our project focused on assessing these issues includes not just a published report, but an on-line companion that provides in-depth assessments of each U.S.-funded program in these areas, a budget database for all threat reduction programs since the inception of the effort, technical background, hundreds of annotated links to the best information on these topics available elsewhere on the internet, and more. We have recently added a summary of latest developments in controlling nuclear warheads and materials, and are continually striving to keep our assessments of these efforts as accurate and up-to-date as possible. This will be a living resource, changing and growing over time (as long as we are able to raise funds and keep the staff needed to maintain it). We welcome any and all comments, suggestions, and corrections.<sup>19</sup>

## ENDNOTES

<sup>1</sup> Matthew Bunn, Anthony Wier, and John P. Holdren, *Controlling Nuclear Warheads and Materials: A Report Card and Action Plan* (Washington, DC: Nuclear Threat Initiative and the Project on Managing the Atom, Harvard University, March 2003, available as of July 11, 2003 at [http://www.nti.org/e\\_research/cnwm/overview/report.asp](http://www.nti.org/e_research/cnwm/overview/report.asp)).

<sup>2</sup> See, for example, Richard Lugar, “Eye on a Worldwide Weapon Cache,” *The Washington Post*, December 6, 2001.

<sup>3</sup> Bunn, Weir, and Holdren, *Controlling Nuclear Warheads and Materials*, op. cit.

<sup>4</sup> For the best available summary, see David Albright, “Al Qaeda’s Nuclear Program: Through the Window of Seized Documents,” Special Forum 47 (Berkeley, Cal.: Nautilus Institute, November 6, 2002; available at [http://www.nautilus.org/fora/Special-Policy-Forum/47\\_Albright.html](http://www.nautilus.org/fora/Special-Policy-Forum/47_Albright.html) as of July 11, 2003).

<sup>5</sup> On potential terrorist bomb-building capabilities, see J. Carson Mark et al., “Can Terrorists Build Nuclear Weapons?” in Paul Leventhal, and Yonah Alexander, *Preventing Nuclear Terrorism* (Lexington, Mass.: Lexington Books, 1987; available at <http://www.nci.org/k-m/makeab.htm> as of July 11, 2003). This remains the most authoritative unclassified treatment of the subject – in part because it represents something of a negotiated statement by experts with a range of views on the matter. See also John P. Holdren and Matthew Bunn, “Technical Background,” *Controlling Nuclear Warheads and Materials* (available at [http://www.nti.org/e\\_research/cnwm/overview/technical.asp](http://www.nti.org/e_research/cnwm/overview/technical.asp) as of July 11, 2003).

<sup>6</sup> See Bunn, Weir, and Holdren, *Controlling Nuclear Warheads and Materials*, op. cit., pp. 12-14.

<sup>7</sup> For an unclassified summary of the situation in Russia from 2002, well after the passing of the 1998 financial crisis, see National Intelligence Council, *Annual Report to Congress on the Safety and Security of Russian Nuclear Facilities and Military Forces* (Langley, Virginia: Central Intelligence Agency, February 2002; available at [http://www.cia.gov/nic/pubs/other\\_products/icarusiansecurity.htm](http://www.cia.gov/nic/pubs/other_products/icarusiansecurity.htm) as of July 11, 2003). For detailed accounts of both the situation in the former Soviet Union and the more global picture, see Matthew Bunn, “The Threat in Russia and the Newly Independent States,” and Matthew Bunn, “The Global Threat,” both in *Controlling Nuclear Warheads and Materials*, available as of July 11, 2003 at [http://www.nti.org/e\\_research/cnwm/threat/russia.asp](http://www.nti.org/e_research/cnwm/threat/russia.asp) and [http://www.nti.org/e\\_research/cnwm/threat/global.asp](http://www.nti.org/e_research/cnwm/threat/global.asp), respectively.

<sup>8</sup> See, for example, Kamran Khan and Molly Moore, “2 Nuclear Experts Briefed Bin Laden, Pakistanis Say,” *Washington Post*, December 12, 2001; Kaman Khan, “Pakistan Releases Nuclear Scientists for Ramadan’s End,” *Washington Post*, December 16, 2001; and Peter Baker, “Pakistani Scientist Who Met Bin Laden Failed Polygraphs, Renewing Suspicions,” *Washington Post*, March 3, 2002.

<sup>9</sup> See discussion in Bunn, Weir, and Holdren, *Controlling Nuclear Warheads and Materials*, op. cit., p. 176.

<sup>10</sup> Two of these were on storage sites, two on transport trains. See Vladimir Bogdanov, “Propusk K Beogolovkam Nashli U Terrorista (A Pass To Warheads Found on a Terrorist),” *Rossiiskaya Gazeta*, November 1, 2002; Pavel Koryashkin, “Russian Nuclear Ammunition Depots Well Protected – Official,” *ITAR-TASS*, October 25, 2001; and “Russia: Terror Groups Scoped Nuke Site,” *Associated Press*, October 26, 2001.

<sup>11</sup> The metrics used in this chart are developed in more detail in the text of the report. Most of the estimates in the figure are based on official data; some are informed guesses, based on government data and interviews with relevant participants, where adequate official data for the measure is not available.

<sup>12</sup> President George W. Bush, “State of the Union Address” (Washington, D.C.: The White House, Office of the Press Secretary, press release, January 28, 2003; available as of July 11, 2003, at <http://www.whitehouse.gov/news/releases/2003/01/20030128-19.html>).

<sup>13</sup> For a discussion of the problems posed by access, in particular, see U.S. Congress, General Accounting Office, *Weapons of Mass Destruction: Additional Russian Cooperation Needed to Facilitate U.S. Efforts to Improve Security at Russian Sites*, GAO-03-482 (Washington, DC: GAO, March 2003, available as of July 11, 2003 at <http://www.gao.gov/new.items/d03482.pdf>).

<sup>14</sup> The House versions of both the foreign relations authorization bill and the defense authorization bill for fiscal year (FY) 2004 contain provisions calling for such a program, but at this writing (mid-July, 2003) the fate of these provisions was not yet decided.

<sup>15</sup> After some excellent statements on the need for expanded threat reduction cooperation immediately after the September 11 attacks, most of President Bush’s statements related to keeping WMD out of terrorist hands have focused on the danger that hostile regimes (such as Iraq) would provide terrorists with these weapons – not on the equally grave danger that terrorists might get WMD without any government wanting that to happen, because of inadequate controls over such stockpiles.

<sup>16</sup> See “Nonproliferation of Weapons of Mass Destruction: A G8 Statement,” June 2, 2003, available as of July 11, 2003 at the Evian summit site at <http://www.g8.fr/evian/english/home.html>.

<sup>17</sup> See, for example, Kenneth N. Luongo, director of the Russian-American Nuclear Security Advisory Council (RANSAC), letter to Colin Powell, Spencer Abraham, and Condoleezza Rice, July 2, 2003, available as of July 11, 2003 at [http://www.ransac.org/new-web-site/whatsnew/070203\\_puncirenewal.pdf](http://www.ransac.org/new-web-site/whatsnew/070203_puncirenewal.pdf).

<sup>18</sup> This is mentioned briefly in GAO, *Weapons of Mass Destruction: Additional Russian Cooperation Needed to Facilitate U.S. Efforts to Improve Security at Russian Sites*, op. cit., pp. 4-5.

<sup>19</sup> These can be sent to [atom@harvard.edu](mailto:atom@harvard.edu), the address of the Managing the Atom project.