

THE  
RACE TO SECURE  
RUSSIA'S LOOSE NUKES:

PROGRESS SINCE 9/11

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## EXECUTIVE SUMMARY

Four years after a bipartisan Task Force recommended an acceleration of programs to secure Russia's vulnerable nuclear weapons and materials by 2009-2011, the United States has failed to dramatically hasten efforts. At the current rate, the United States may not reach that goal until 2020-2030. Today, enough Russian bomb-grade material for tens of thousands of nuclear weapons remains potentially vulnerable to theft. With *al Qaeda* and other terrorist organizations having stated their intent to acquire a nuclear device, this potentially catastrophic synthesis of factors has led to realistic fears of a nuclear 9/11.

**At the current rate, the United States may not secure Russian weapons and materials until 2020-2030.**

In January 2001, a bipartisan Task Force led by former Senate Majority Leader Howard Baker (R-TN) and former White House Counsel Lloyd Cutler outlined a strategic plan for dealing with Russia's so-called "loose nukes" problem. Finalized before the onset of the bitter partisanship that divides the country over the course of national security policy today, the plan represented the unvarnished consensus of a distinguished, bipartisan group of leading national security experts (see Appendix I). The Task Force concluded that implementing the proposed strategy would require sustained, active presidential leadership backed by a new senior-level White House coordinator, an infusion of financial resources, and strengthened cooperation with Russia. The Task Force's overarching recommendation was for *a rapid increase in the pace of programs* to secure Russian weapons, material and expertise.

The United States government has made discrete but noteworthy progress in securing vulnerable nuclear weapons, materials and expertise in Russia since 9/11. It reached agreements with Russia to improve security at nuclear weapons facilities that were previously off-limits to cooperation. It revitalized efforts to secure civilian highly enriched uranium (HEU), and enhanced international political and, to a lesser extent, financial support for nonproliferation programs in Russia. The United States government has also taken steps to strengthen a dimension of nuclear security that the original Task Force left largely unaddressed: strengthening the global capacity for intercepting illicit shipments of weapons materials and technology.

But overall, the Bush administration and the Congress have neither achieved nor made substantial progress towards most of the strategic objectives. Of the 19 policy measures identified by the Task Force, only five have seen meaningful progress towards full implementation (see Fig. 1). For the remaining 14 recommendations, progress has been minimal.

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The primary reasons for the failure to accelerate progress are similar to the obstacles identified by the Task Force in 2001. Intransigence on the part of the Russian government has complicated the full and effective implementation of these programs. Its stubbornness over allowing U.S. personnel sufficient

access to sensitive sites to verify that cooperation has been especially disruptive. Poor leadership and an uneven commitment by the United States are also to blame. There is no clear, senior-level leadership in the United States responsible for coordinating and advancing American nuclear threat reduction objectives. The programs continue to suffer from insufficient and inconsistent budgetary support. And the United States has not done enough to address Russian sensitivities, especially with respect to which party bears liability in the event that an accident or sabotage occurs in the course of threat reduction work.

The Task Force's assessment of the threat is as true today as it was in 2001:

[T]he most urgent unmet national security threat to the United States today is the danger that weapons of mass destruction or weapons-usable material in Russia could be stolen and sold to terrorists or hostile nation states and used against American troops abroad or citizens at home.<sup>1</sup>

The proven cost-effectiveness of threat reduction programs, combined with the urgency of the threat, makes it imperative that the United States government exercise leadership to overcome obstacles in order to accelerate these critical programs.

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<sup>1</sup> The Secretary of Energy Advisory Board, United States Department of Energy, *A Report Card on the Department of Energy's Nonproliferation Programs with Russia*, p.iii (January 2001), available at <http://www.stimson.org/ctr/?SN=CT20050720884> [hereinafter "Baker-Cutler Task Force"].

**Figure 1**



## Measuring Progress

Implementation of the Task Force's Strategic Plan

Task Force's Recommendations	Implementation Status as of FY2004 <sup>1</sup>
<b>Secure Russian Nuclear Weapons And Material:</b>	
Drastically consolidate the number of storage sites	X
Accelerate security upgrades	X
Help the Russians develop a reliable, modern accounting system for their nuclear warheads	✓
Secure the return of Russian-origin HEU from foreign reactors	✓
Minimize the proliferation threat posed by Russian general-purpose nuclear submarines.	X
<b>Eliminate Excess Russian HEU:</b>	
Expand Russian capacity for eliminating HEU	X
Accelerate elimination of HEU under the HEU Purchase Agreement	X
<b>Manage Excess Russian Plutonium:</b>	
Store up to 100 metric tons of plutonium at the Mayak facility	X
Eliminate up to 100 metric tons of Russian plutonium	X
Prepare an inventory of Russia's total stockpile of plutonium	X
Halt additional Russian production of plutonium	X
<b>Downsize The Nuclear Complex:</b>	
Eliminate excess Russian nuclear weapons infrastructure	✓-
Accelerate efforts to prevent Russian weapons expertise from spreading	✓
<b>Plan For Russian Financing Of Sustainable Security:</b>	
Develop new revenue streams for financing Russian nonproliferation programs	✓
Seek specific commitments from Russia to fund security	✓
Begin detailed planning for the transition away from U.S. financial support	X
<b>Enable Accelerated Progress:</b>	
Appoint a single high-level individual to coordinate program and prepare integrated plan	X
Clear bureaucratic and legal underbrush	✓-
Provide needed resources	✓-
<b>Key:</b> X=No meaningful acceleration of progress   ✓=Acceleration of progress   ✓-=Mixed results	

1. Most recent date for which comprehensive data is most consistently available.

In keeping with the urgency of this threat, we recommend that:

- The president appoint a high-level coordinator with budgetary authority within the White House to coordinate U.S.-Russian nonproliferation programs
- The administration settle the dispute over legal liability by accepting rigorous but more balanced liability provisions in bilateral threat reduction agreements
- The administration offer reciprocal access to U.S. nuclear facilities in order to expand the scope of threat reduction work to sensitive Russian facilities
- The president and the Congress dramatically increase funding for Russian threat reduction work, consistent with the elimination of obstacles that put a ceiling on the pace and scope of existing cooperation
- The Congress grant U.S. program managers increased flexibility over programs and budgets to ensure more effective implementation
- The U.S. and Russian presidents jointly develop comprehensive inventories of continued threats from the former Soviet arsenal including inventories of weapons, materials, and expertise
- Congress and the administration strengthen involvement of the U.S. and Russian private sectors to make programs more effective and decrease the funding burden on U.S. taxpayers
- The president redouble efforts to expand the scope of cooperation and support for the Proliferation Security Initiative, the G8 Global Partnership Against the Spread of Weapons and Materials of Mass Destruction, and UN Security Council Resolution 1540

## METHODOLOGY

This report assesses progress by the U.S. government on implementing the recommendations of the Baker-Cutler Task Force's 2001 report. The report focuses primarily on Department of Energy programs, as the Task Force did, but following the original report, it also includes key accomplishments of the Departments of Defense and State in order to compile a more accurate assessment of progress. Our goal is to focus needed attention on this critical issue, identify past successes so that they can be leveraged, and expose shortcomings so that they can be remedied. Our recommendations expand on the Task Force's recommendations, and form the basis for a new blueprint for action.

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Most of the policy recommendations made by the Task Force are measurable, and the U.S. government provides significant—though not always complete or consistent—data on progress. Using this data, the report compares where progress stood at the end of FY 2001—a budget shaped before the Task Force released its report—to where progress stood at the end of FY 2004, the latest date for which data is consistently available. The analysis also draws on official data reported at the beginning of calendar year 2001 to fill gaps and on well-known and highly-regarded technical estimates by other experts where official data is unclear or incomplete. It is important to stress that the figures cited are estimates based on the best available evidence. These estimates, however, are sufficiently specific to enable us to identify broad trends in the scale and scope of efforts to secure Russian materials, weapons, and expertise, which is a goal of this study.

The report also assesses the Bush administration and the Congress's efforts to strengthen capacity for identifying and intercepting illicit shipments of weapons, materials, and technology. The Task Force did not devote extended analysis to this issue because it concluded that securing materials and expertise at one of their largest potential sources is the surest way to prevent a nuclear terrorist attack against the United States. With terrorism on the rise and no acceleration of the pace of efforts to secure materials, however, it makes sense to devote additional attention to this important component of a layered strategy.

## BACKGROUND

The fragmentation of the Soviet Union into more than a dozen fledgling states left nuclear weapons, materials, and expertise under precarious security conditions sprawled across territory spanning eleven time zones. Thousands of warheads on so-called “launch-on-warning” status were scattered throughout Russia, Belarus, Kazakhstan, and Ukraine. Well-documented instances of disruption of their command and control raised serious questions over the possibility of accidental launches. As centralized Soviet authority crumbled, so did the rigorous security practices governing fissile materials and nuclear weapons. The economy was in shambles, and the Russian Federation—which gained custody over most of the former Soviet Union’s nuclear weapons complex—did not have the resources to adequately protect its nuclear weapons, materials, and expertise from diversion by terrorists and rogue states.

The United States Congress first took action in 1991, passing the *Soviet Nuclear Threat Reduction Act* (P.L. 102-228). Commonly referred to as the “Nunn-Lugar” program after the two senators who pioneered its creation—Senator Sam Nunn (D-GA) and Senator Richard Lugar (R-IN)—the legislation gave the president the authority to establish a collaborative program to help the former Soviet Union protect and dismantle its stockpiles of nuclear, chemical, and biological weapons, technologies, and delivery systems. Initially operating out of the Department of Defense and without a dedicated budget, by 2000 these efforts spanned the Departments of Defense, Energy and State and had dedicated funding streams of roughly \$1 billion each year. A series of bilateral agreements with Russia—such as the 1992 CTR Umbrella Agreement—specified the terms of this cooperation.

By 2000, the efforts had racked up an impressive list of accomplishments: security measures for safeguarding 192 metric tons of fissile material—equivalent to some 8,000 nuclear bombs—had been improved and more than 5,000 Russian strategic nuclear warheads had been deactivated. In addition, more than 15,000 former nuclear, chemical, biological and missile scientists had been engaged in collaborative studies with Western firms or researchers, thus helping to alleviate the desperate economic conditions that could lead some of these experts to sell their expertise to terrorist groups or rogue nations.

Despite these significant advances, it was alarmingly clear by 2000 that the job was far from done. Russia and the countries of the former Soviet Union still had enough fissile material for thousands of weapons, much of it inadequately secured against theft. Although U.S. and international programs had engaged thousands of former weapons scientists through collaborative research grants, it was proving considerably more difficult to identify sustainable, long-term employment for them. Little was known about the security of Russia's nuclear weapons, especially its tactical nuclear weapons—small, portable weapons that would make an ideal terrorist nuclear device. In December 1998, Osama bin Laden—who that summer had orchestrated attacks on U.S. embassies in Kenya and Tanzania—declared it a “religious duty” to acquire nuclear weapons and threaten the United States or its interests.<sup>2</sup> The need for a more aggressive program was clear.

Despite significant accomplishments securing Russian weapons and materials, it was alarmingly clear in 2000 that the job was far from done

In a bid to build on past success, debunk misperceptions, and address legitimate concerns about the programs, then-Secretary of Energy Bill Richardson convened in February 2000 a bipartisan Task Force on the Evaluation of the Department of Energy's Nonproliferation Programs with Russia. The goal of Task Force was to:

[P]rovide appraisals and recommendations to the Secretary of Energy regarding the policy priorities established by DOE to pursue cooperative nonproliferation and nuclear safety programs with Russia, with an eye to identifying crucial program areas that may not have been addressed in the past.”<sup>3</sup>

The Task Force was co-chaired by former Senate Majority Leader Howard Baker (R-TN) and the late Lloyd Cutler, a former White House Counsel, and was comprised of leading national security experts drawn from the academic, think-tank, and policy communities. (See Appendix I for a list of Task Force members.)

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<sup>2</sup> PBS Frontline Interview of December 23, 1998, *available at* <http://www.pbs.org/wgbh/pages/frontline/shows/binladen/who/edicts.html>

<sup>3</sup> Baker-Cutler Task Force, Appendix C: Terms of Reference.

Over the course of the next 11 months, the Task Force received extensive briefings on nonproliferation and threat reduction from the U.S. Department of Energy and other agencies. It consulted with leading think tanks and NGOs specializing in nonproliferation, and met with the private U.S. commercial entities that implement nonproliferation programs on the ground in the region. The Task Force also traveled to Russia, where it examined many of the programs in action and met with Russian officials to further refine the Task Force’s findings and recommendations.

On January 10, 2001, the Task Force presented its final report, in which it concluded that,

[T]he most urgent unmet national security threat to the United States today is the danger that weapons of mass destruction or weapons-usable material in Russia could be stolen and sold to terrorists or hostile nation states and used against American troops abroad or citizens at home.<sup>4</sup>

The overarching recommendation of the Task Force was that:

[O]ne of the first initiatives of the new President be the formulation of a comprehensive, integrated strategic plan...to secure and/or neutralize in the next eight to 10 years all nuclear weapons-usable material located in Russia and to prevent the outflow from Russia of scientific expertise that could be used to build nuclear or other weapons of mass destruction.<sup>5</sup>

The Task Force emphasized the imperative of securing weapons-usable fissile materials. “[M]any of the Russian nuclear sites remain vulnerable to insiders determined to steal enough existing material to make several nuclear weapons and to transport these materials” to unstable regimes or terrorists.<sup>6</sup>

The Task Force found that “a nuclear engineer graduate with a grapefruit-sized lump of [highly enriched uranium] or an orange-sized lump of plutonium, together with material otherwise readily available in commercial markets, could fashion a nuclear device that would fit in a van.”<sup>7</sup> Non-state entities do not have the capacity to make highly enriched uranium (HEU) and plutonium—the “gunpowder” needed for a nuclear

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<sup>4</sup> Ibid., p.iii.

<sup>5</sup> Ibid., p.x.

<sup>6</sup> Ibid., p.vi.

<sup>7</sup> Ibid., p.vi.

explosion—without the active support of a state sponsor; without such support, their only option would be to procure the materials from an existing stockpile, such as Russia’s. The Task Force also concluded that a terrorist would in all likelihood be able to smuggle the weapon into the United States.

In light of the unacceptably high probability that a terrorist group that succeeded in acquiring fissile materials would be in a position to carry out a nuclear terrorist attack against the United States, the Task Force recognized that “[t]he best defenses against a nuclear... weapons attack on U.S. territory [are] to control the supply and to prevent terrorists from gaining access to the material needed to create such weapons.”<sup>8</sup> Russia was and remains by far the largest possible source of fabricated weapons and bomb grade materials.

Based on this threat assessment, the Task Force recommended the development of a strategic plan for achieving five vital objectives:

1. Secure Russian nuclear weapons and material by 2009-2011 by accelerating efforts to lockdown nuclear weapons and materials in as few locations as possible;
2. Eliminate excess Russian highly enriched uranium by accelerating the pace at which it is diluted into “low-enriched uranium,” rendering it unsuitable for use in nuclear weapons;
3. Manage excess Russian plutonium by permanently isolating greater quantities than originally planned;
4. Downsize the Russian nuclear complex by eliminating excess nuclear weapons infrastructure and developing mechanisms to prevent Russian weapons expertise from spreading; and
5. Plan for Russian financing of sustainable security by developing alternative forms of financing for nonproliferation programs.

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<sup>8</sup> Ibid., p.8.

The Task Force laid out specific policy measures to implement these objectives and identified the obstacles that the new president would have to clear in order to accelerate the pace of work. The Task Force's overarching recommendation was for *a rapid increase in the pace of programs* to secure Russian weapons, material and expertise. The Task Force emphasized that existing efforts were proceeding far too slowly when compared with the urgency of the threat. It recognized that achieving these objectives would require the full cooperation of parallel nonproliferation programs at the Departments of Defense and State, and stressed the need for an integrated, crosscutting strategy. The Task Force identified active, sustained leadership from the new president and consistent, adequate funding from the Congress as particularly vital to success.

## THE BUSH ADMINISTRATION RECORD

During President Bush's first term, the United States has made some important advancements against the threat posed by poorly secured Russian weapons, materials, and expertise. The President spearheaded the launch of the G8 Global Partnership Against the Spread of Weapons and Materials of Mass Destruction, through which more than a dozen countries have pledged to spend \$20 billion over 10 years on nonproliferation work in Russia. If the G8 succeeds in meeting the \$20 billion pledge goal and the funds are rapidly put to use, then the G8 Global Partnership has the promise to ease the financial burden on the United States of addressing the Soviet Union's nuclear legacy. U.S. leadership was also critical in concluding United Nations Resolution 1540, which *inter alia*, obligates all states to take extensive measures to prevent terrorists from acquiring weapons or materials of mass destruction in their territory. If the United States and Global Partnership countries provide tangible and prompt support to countries that have vulnerable materials or attractive smuggling routes but that lack the capacity to take action, then Resolution 1540 will have made the United States safer.

The president also deserves credit for strengthening global capacity for identifying and intercepting attempted illicit shipments of weapons and materials with his launch of the Proliferation Security Initiative, designed to improve international cooperation on interdicting illicit weapons shipments. These and related efforts to install radiation detection equipment at important transit points around the world are positive

developments. On the other hand, their promise is limited due to the enormous technical difficulties associated with detecting the small amount of materials needed to build a crude nuclear weapon. As noted by the Task Force in 2001, securing materials at their source remains the surest way to guard against terrorist acquisition of nuclear weapons (see Box 1).

### **Box 1 – The Path to the Bomb**

There are three basic steps any terrorist or extreme regime must take in order to attack the United States with a nuclear weapon: acquire highly enriched uranium (HEU) or weapons-grade plutonium, build a nuclear bomb using the materials, and deliver the bomb to its target.

The most formidable of these steps is acquiring fissile materials. Without them, a nuclear weapon cannot be built and nuclear terrorism is not possible. An extremist regime could attempt to manufacture HEU or plutonium, a process that requires extensive technical expertise and highly sophisticated technical infrastructure. Some states—such as Iraq and Libya—tried for decades to build a domestic production capacity, while other states—such as North Korea and Pakistan—succeeded only after many years of intense effort. A terrorist’s only option for acquiring materials would be to procure them from an existing stockpile—either through theft or some other illicit transfer—because manufacturing materials lies well beyond even a highly sophisticated terrorist organization’s technical capabilities.

Once a terrorist organization acquires the materials, an attack becomes highly probable because the final two steps are far less daunting. A decades-old consensus among nuclear weapons experts suggests that it would only be a matter of time before a committed state produces a nuclear bomb following the acquisition of HEU or plutonium. If sufficient HEU is acquired, a terrorist organization with relatively modest engineering and physics expertise could build a crude nuclear device. A study by scholars at the Council on Foreign Relations and Stanford University found that a nuclear weapon shielded by a thin layer of lead stood a 90 percent chance of making it through U.S. Customs undetected,<sup>9</sup> while the technical and intelligence obstacles that hinder detection of attempted shipments of nuclear weapons or fissile materials are so high that we are unlikely to have a reliable capacity for doing so for the near future.

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<sup>9</sup> See Lawrence Wein et al, “Preventing the Importation of Illicit Nuclear Materials in Shipping Containers,” *available at* <http://faculty-gsb.stanford.edu/wein/personal/container.pdf>.

Beyond these limited, albeit important, developments, the pace of progress is otherwise slow. Halfway through the eight- to 10-year timetable promulgated by the Task Force, we find that of the 19 specific policy measures the Task Force identified as necessary to execute its strategic

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plan, only five have seen meaningful progress towards full implementation. For the remaining recommendations, there is either little or no measurable progress toward acceleration (see Fig. 1). As a result, the United States could be more than two decades behind meeting the Task Force's recommendation that Russian fissile materials be secured by 2010.

The factors responsible for the slow pace are similar to the factors that the Task Force identified in 2001 as obstructing progress. Elements within the Russian bureaucracy still do not fully collaborate, as Cold War suspicions continue to shape some Russian official's views on cooperation with the United States, leading them to refuse access to sites they deem as sensitive.

Bureaucratic and legal obstacles created and perpetuated by the U.S. government have also obstructed progress. A key obstacle in recent years has been U.S. insistence that Russia bear all, or nearly all, responsibility for accidents and sabotage that might occur during the course of threat reduction work—even if the United States or its contractors are to blame. Erratic U.S. funding remains an obstacle as well.

These obstacles needlessly complicate the difficult task of working out the terms of cooperation over delicate nuclear weapons-related issues. The Task Force was aware of these impediments, and agreed that resolving them would require top-level leadership. It recommended the creation of a senior White House post dedicated to resolving these issues. The United States has not created such a position due to a lack of support within the current White House and sporadic support for the concept from within the Congress.

## Bureaucratic and legal obstacles

There are two key legal obstacles hampering implementation of the Baker-Cutler strategy: access to sensitive sites, and liability for accidents that occur in the course of securing Russian weapons, materials and expertise.

**Access:** The obstacles identified in 2001 as preventing accelerated progress continue to inhibit progress today. Russia continues to resist granting American personnel sufficient access to sensitive sites to verify that American tax dollars are appropriately spent.<sup>10</sup> This has slowed the pace of existing cooperation, and limits the prospects for opening new areas of cooperation. In December 2004, the president raised the possibility of reciprocal access to U.S. sites; it is unclear how intensely the administration has pursued this in negotiations with the Russians.

**Liability:** The United States has so far conditioned much of its participation in nonproliferation programs beyond June 2006 on Russia accepting blanket liability for accidents or sabotage, even if the accident is caused by the United States. On that date, the 1999 extension to the 1992 Cooperative Threat Reduction Agreement between the United States and Russia that authorizes all Department of Defense (DOD) programs and key Department of Energy (DOE) programs expires. Without a renewed or replacement agreement, these programs will lapse.

The United States is currently requesting unreasonable liability protections during the course of threat reduction work, and is the only country among the many countries involved in Russian nonproliferation efforts to insist on such standards. Not all U.S.-Russian bilateral agreements in the past—such as those governing the Nuclear Cities Initiative, plutonium science and technology, and nuclear safety cooperation—had such unreasonable liability provisions. Even these agreements have since been allowed to lapse as a result of the Bush administration's refusal to budge on this issue.

The nature of the dispute, in light of the United States' fundamental national security interest in seeing these programs accelerated, was aptly summarized by Senator Pete Domenici (R-NM) in July 2005:

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<sup>10</sup> R. Douglas Brubaker and Leonard S. Spector, "Liability and Western Nonproliferation Assistance to Russia: Time for a Fresh Look?", *Nonproliferation Review* (Spring 2003), available at <http://cns.miis.edu/pubs/npr/vol10/101/101brub.pdf>.

Why a program of this much global importance should be blocked by something as basic as liability remains beyond me. I have been amazed that the leadership of the United States and Russia cannot resolve this issue. Failure to resolve this issue is simply not consistent with the urgency that the administration has attached to nuclear proliferation. Good proposals for the resolution have been circulated, but not accepted so far.<sup>11</sup>

Continued disputes over this provision have cast a shadow over the future of nonproliferation cooperation between both countries. Recent statements from American and Russian officials seem to indicate progress toward resolving the liability issue as it pertains to plutonium disposition (discussed under Task Force Objective #3), though it is unclear as of August 2005 what progress on this front means for other programs to secure weapons and materials.

### Inadequate and Uneven Funding

The Task Force found that funding levels in 2001 were “not sufficient to meet the challenge.”<sup>12</sup> It recommended immediate increases for mature programs that could productively use more resources, and gradual increases for other programs once the United States and Russia cleared the legal and bureaucratic underbrush that are holding them back. It noted that annual U.S. spending on controlling and securing nuclear weapons in Russia then totaled approximately \$706 million—a fraction of the \$5.8 trillion the U.S. spent on its nuclear arsenal during the Cold War. Securing necessary resources for existing programs remains an annual battle. An appendix to the Task Force’s report contained a budget outline that suggested approximately \$30 billion over ten years would be required to secure Russian weapons, materials and expertise. (see Fig. 2)

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<sup>11</sup> Oral Statement of Hon. Pete V. Domenici before the Committee on Foreign Relations, United States Senate, 108th Congress/2nd session, S. HRG. 108-675 (June 15, 2004).

<sup>12</sup> Baker-Cutler Task Force, p.20.

**Figure 2**

# Measuring the Baker-Cutler Spending Goals The First Five Years

**Baker-Cutler 10-Year Target vs. Actual Appropriation FY2002-FY2006<sup>1</sup>**

<p><b>\$30 billion</b> vs. <b>\$1.89 billion</b></p> <p>Task Force's funding target for FY 2002-FY 2012      Actual Appropriations for FY 2002-FY 2006</p>	
Outline of Proposed Spending Over 8-10 Years	Total Proposed vs. Spent
<p><b>Securing Excess Plutonium</b> Purchase and secure monitored storage of up to 100 MT: \$3B Conversion of Plutonium pits to oxide: \$1B Immobilize or irradiate up to 100 MT: \$5B</p>	<p>Proposed: \$9 billion Spent: \$0.23 billion<sup>2</sup></p>
<p><b>Securing Excess Russian HEU</b> (rates established by HEU agreement i.e. \$20M/MT to purchase) Purchase additional 200 MT HEU: \$4B Downblend remaining excess HEU: \$7B</p>	<p>Proposed: \$11 billion Spent: \$0</p>
<p><b>Improving Security and Accounting for Nuclear Material in Russia</b> MPC&amp;A improvements would include material consolidation; equipment upgrades; training of operators, managers and regulators; computerized inventory systems; upgrading security during transport, etc.</p>	<p>Proposed: \$11 billion Spent: \$1.25 billion<sup>3</sup></p>
<p><b>Downsizing And Restructuring Of Russia's Excess Nuclear Complex</b> Facility downsizing and preparation for civilian use: \$2B Employ knowledgeable nuclear personnel: \$700M Replace Pu Reactors: \$300M</p>	<p>Proposed: \$3 billion Spent: \$0.24 billion<sup>4</sup></p>
<p><b>Assure Transparency In Russia And Verify Progress</b></p>	<p>Proposed: \$2 billion Spent: \$0.16 billion<sup>5</sup></p>

1. FY 06 figures based on the President's budget request  
 2. Russian Plutonium Disposition (DOE)  
 3. Material Protection, Control, & Accounting (DOE)  
 4. Includes Nuclear Cities Initiative (DOE); Initiatives for Proliferation Prevention (DOE); ISTC (State)  
 5. HEU Transparency Implementation (DOE); Plutonium Registry (DOE); Russia/NIS Safeguards Sustainability (DOE); Warhead and Fissile Material Transparency (DOE)

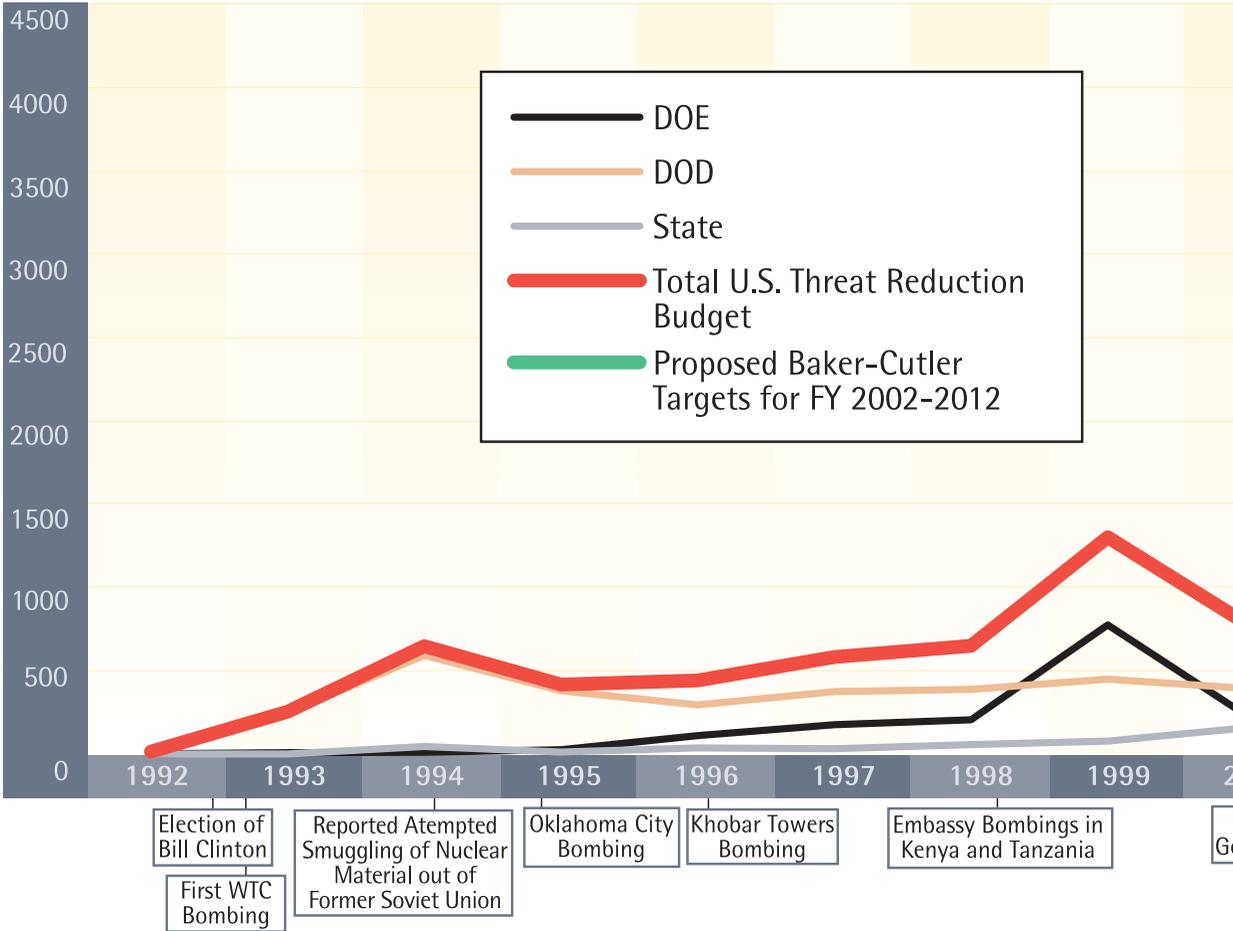
Funding for programs to secure Russian nuclear weapons and materials has increased only marginally since the Task Force released its report (see Fig. 3). After a comprehensive review of threat reduction and non-proliferation programming, the Bush administration proposed a 32 percent cut to Russian nuclear weapons-related threat reduction efforts run by the Department of Energy for FY 2002.<sup>13</sup> Congress rejected the request to cut funding, but did not significantly increase funding either.

<sup>13</sup> See William Hoehn, "Analysis of the Bush Administration's Fiscal Year 2002 Budget Requests for U.S.-Former Soviet Union Nuclear Security: Department of Energy Programs," Russian-American Nuclear Security Advisory Council (RANSAC, August 10, 2001), available at [http://www.ransac.org/Publications/Congress%20and%20Budget/Federal%20Budget%20and%20Congressional%20Updates/2001%20\(FY%202002\)/index.asp](http://www.ransac.org/Publications/Congress%20and%20Budget/Federal%20Budget%20and%20Congressional%20Updates/2001%20(FY%202002)/index.asp).

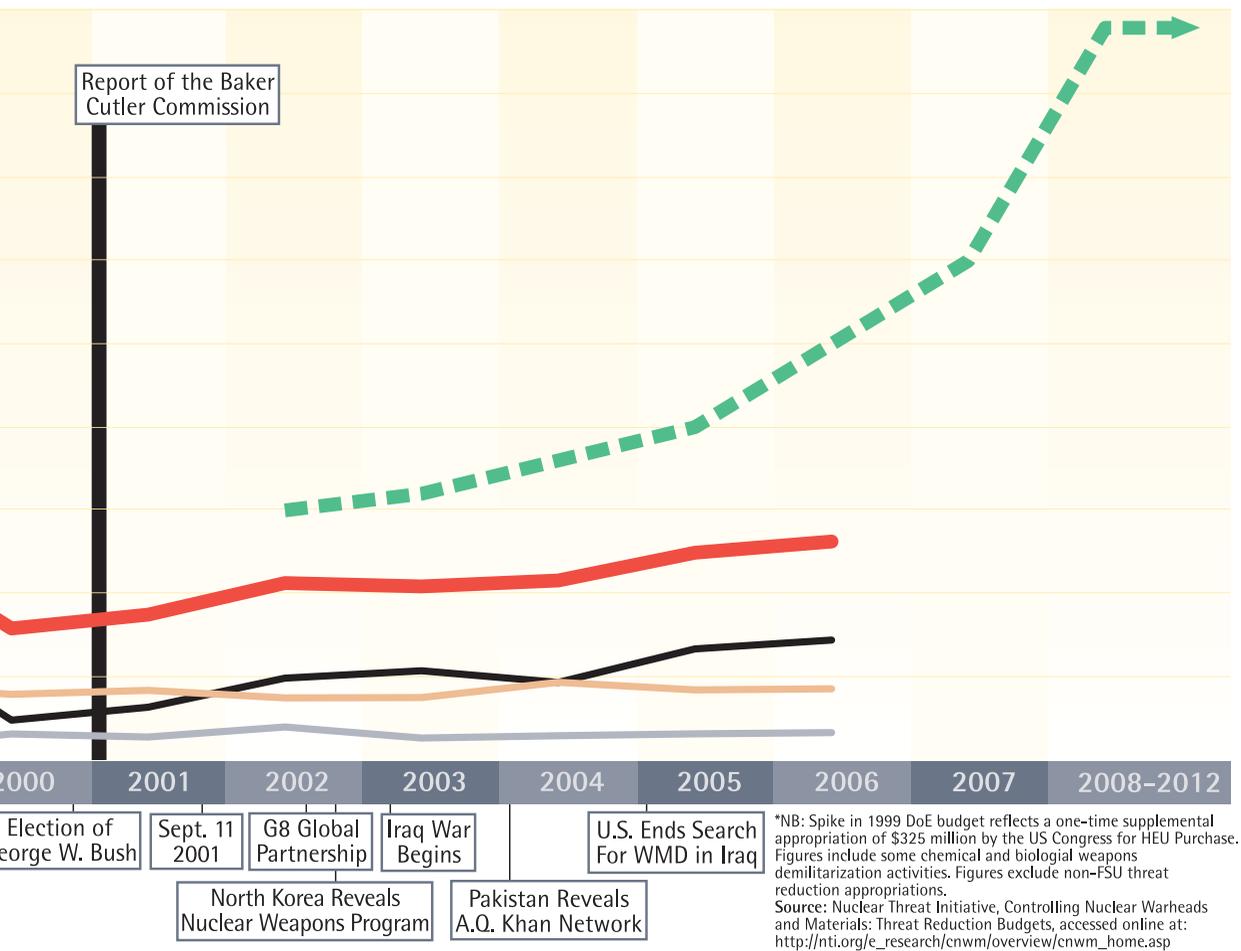
**Figure 3**

### Historical Budgets for US-Russia Non-Proliferation Programs

FY1992 through President's Request FY2006, In Millions of US Dollars



The overall budget for Russian nonproliferation programs run by the Departments of Defense, Energy and State has increased by 24 percent, from \$1,063 million in FY 2002 to the president's FY 2006 request of \$1,312 million, with much of the increase going towards, *inter alia*, programs focusing on the trafficking of nuclear material through airports, seaports, and border crossings in Russia and other key transit states,



ending weapons grade plutonium production in Russia, and efforts to shut down Russia's remaining plutonium generating nuclear reactors. Figures reflecting massive new appropriations in threat reduction and nonproliferation programs are disingenuous insofar as they include spending on U.S. domestic programs. While ensuring the safety and ultimate elimination of U.S. stockpiles of bomb-grade materials is

important, the relative threat posed by the insecurity of the former Soviet stockpile suggests much greater importance should be given to overseas nonproliferation efforts.

As the Task Force noted, however, overall funding increases are neither a panacea nor the ultimate measure of progress. Without sustained high-level leadership to ensure that additional funds are used effectively, massive infusions of appropriations are unlikely to result in a significant acceleration of progress in most cases.

### Lack of High-Level Coordination and Leadership

In 2001, the Task Force recognized that these obstacles would be difficult to overcome, and that resolving them required sustained, high-level attention. The Task Force also assessed that U.S. nonproliferation efforts, which at the time spanned three departments and now span four, needed better coordination to develop synergies and avoid wasteful redundancies. (see Fig 4) The Task Force recommended the creation of a high-level position within the White House tasked with working to resolve political obstacles and coordinate policy and budgets within the U.S. government.<sup>14</sup> While some administration officials have maintained that such a capacity currently exists within the National Security Council, those staff members are not empowered to direct the programs or manage their budgets.

The United States has no known plans to create such a position, however, and is not known to have pressed the Russian Federation to create one.<sup>15</sup> Political and bureaucratic obstacles continue to stymie progress. As a result, U.S. nonproliferation programs continue to experience significant coordination difficulties, according to a 2005 study by the Government Accountability Office.<sup>16</sup>

As noted above, the Task Force called upon the administration, presumably through the new coordinator, to formulate a strategic plan that specified clear goals and benchmarks for measuring progress. A failure to

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<sup>14</sup> The concept of a nonproliferation coordinator was also endorsed by both American and Russian scientific advisers in December 2002. Mike Nartker, "U.S.-Russia: Experts Call for 'Nuclear Czars' to Oversee Nonproliferation Efforts," *Global Security Newswire* (February 12, 2003), available at [http://www.nti.org/d\\_newswire/issues/2003/2/12/7s.html](http://www.nti.org/d_newswire/issues/2003/2/12/7s.html).

<sup>15</sup> In 1996, the U.S. Congress proposed to establish a single position to oversee nonproliferation programs across the U.S. government. Ultimately, that provision was weakened by appending the role of "monitoring non-proliferation programs" to an existing NSC position.

<sup>16</sup> Government Accountability Office, "Weapons of Mass Destruction Nonproliferation Programs Need Better Integration," *GAO-05-157* (January 2005).

**Figure 4**



## Bureaucratic Overlap and Diffused Responsibility: U.S. Agencies Involved in Russian Threat Reduction

Baker-Cutler Task Force Goals	DOE	DOD	DOS	DHS <sup>1</sup>
<b>Securing Russian Weapons And Materials</b>				
Consolidating Russian nuclear weapons and materials	X	X		
Securing Russian nuclear weapons storage sites	X	X		
Securing Russian nuclear materials storage sites	X			
Securing the transportation of Russian weapons and materials	X	X		
Securing the return of Russian-origin HEU from research reactors	X			
<b>Eliminate Excess Russian HEU</b>				
Downblending excess Russian HEU into LEU	X			
<b>Manage Excess Russian Plutonium</b>				
Securing and eliminating excess Russian plutonium	X	X		
Accounting for excess Russian plutonium	X	X	X	
Halt production of plutonium	X			
<b>Downsize The Nuclear Complex</b>				
Eliminating excess weapons production, maintenance, and related infrastructure	X	X	X	
Redirecting Russian weapons experts to peaceful pursuits	X	X	X	
<b>Plan For Russian Financing Of Sustainable Security</b>				
Developing new funding streams			X	
<b>Intercept Illicit Shipments Of Weapons And Materials</b>				
Building global capacity to detect illicit shipments	X		X	X
Improving domestic capacity to detect illicit shipments	X			X
Strengthening global capacity to interdict illicit shipments	X	X	X	
<b>Ensuring The Smooth Operation Of These Efforts</b>				
Identifying yearly goals and priorities for threat reduction work	X	X	X	X
Resolving disputes over liability and access	X	X	X	

1. The Department of Homeland Security, created in 2003, is involved in efforts to strengthen global and domestic capacity to detect illicit shipments of weapons and materials.

take the recommended action led the Congress to mandate such a report in the Fiscal Year 2002 Authorization Bill (P.L. 107-107). Section 1205 of that bill requires the administration to prepare and submit to Congress a Plan for Securing Nuclear Weapons, Material, and Expertise of the States of the Former Soviet Union.<sup>17</sup> The administration submitted a plan that was less a comprehensive strategy to integrate programs and implement the recommendations of the Task Force and more an overview of existing programs and roster of accomplishments.

<sup>17</sup> Executive Branch Report, *Plan For Securing The Nuclear Weapons, Material, And Expertise Of The States Of The Former Soviet Union* (Spring 2003), available at [http://204.71.60.38/e\\_research/official\\_docs/pres/2003adminplan.pdf](http://204.71.60.38/e_research/official_docs/pres/2003adminplan.pdf).

## Recommendations

To accelerate progress, it is imperative that the United States resolve the access and liability issues, fund programs, and ensure that these initiatives receive essential top-level political coordination and oversight. The United States should:

- **Offer access to U.S. sites in exchange for access to Russian sites.** U.S. negotiators should be given the authority to offer reciprocal access to Russian teams as an innovative mechanism to circumvent the long-standing dispute over access to sensitive Russian facilities where fissile material and warheads are stored.
- **Settle the dispute over legal liability.** During discussions over a new government-to-government agreement that would enable progress toward plutonium disposition, U.S. negotiators have signaled a willingness to accede to the Russian negotiating position and return to the less stringent standards previously accepted by the United States. Absent a willingness to extend similar offers under the CTR Umbrella agreement, U.S. negotiators should explore other creative solutions including consideration of innovative risk-sharing arrangements.<sup>18</sup>
- **Support adequate and sustained funding.** As legal and bureaucratic obstacles are eased, the president and Congress should work to provide adequate and sustained funding to address the original Baker-Cutler funding target of \$30 billion over 10 years.
- **Appoint a top-level coordinator for all threat reduction and nonproliferation programs.** Located in the Executive Office of the President, the director of the Office should have responsibility for the overall direction and coordination of the various threat-reduction and nonproliferation programs, as well as budgetary authority over relevant activities conducted by all three Cabinet departments—Defense, Energy, and State.

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<sup>18</sup> For a detailed discussion of this issue, see R. Douglas Brubaker and Leonard S. Spector, “Liability and Western Nonproliferation Assistance to Russia: Time for a Fresh Look?” *Nonproliferation Review* (Spring 2003), available at <http://cns.miis.edu/pubs/npr/vol10/101/101brub.pdf>.

## TASK FORCE OBJECTIVE #1: SECURE RUSSIAN NUCLEAR WEAPONS AND MATERIAL

The Task Force offered five specific recommendations for securing Russian weapons and materials:

- Consolidate the number of sites where material and weapons are held
- Accelerate security upgrades for the remaining buildings in use
- Help the Russians develop a reliable, modern accounting system for their nuclear warheads
- Secure the return and elimination of Russian-origin HEU from foreign reactors
- Minimize the proliferation threat posed by Russian general-purpose nuclear submarines.

Four years after the Task Force released its findings, the United States has made meaningful but insufficient progress towards securing Russian nuclear materials and consolidating them into fewer storage locations.

But overall, we find that of these five recommendations, progress has accelerated on just two of them: helping the Russians develop modern accounting for their nuclear warheads and securing the return of Russian-origin HEU. Most distressingly, progress on securing Russian weapons and materials in the four years that have passed since the release of the Task Force’s report in January 2001 falls far short of the central goal identified by the Task Force: *to secure Russian nuclear weapons and weapons usable materials by or around 2010 by accelerating the pace and scope of Russian nonproliferation efforts*. Overall, these efforts have not been accelerated.

At the current pace, these materials could remain vulnerable well into the third decade of the 21<sup>st</sup> century—more than a two decades later than the goal recommended by the Task Force.<sup>19</sup>

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<sup>19</sup> Matthew Bunn and Anthony Wier, “Securing the Bomb 2005: The New Global Imperatives,” *Project on Managing the Atom/Nuclear Threat Initiative*, p. vi (May 2005), available at [http://www.nti.org/e\\_research/report\\_cnwmupdate2005.pdf](http://www.nti.org/e_research/report_cnwmupdate2005.pdf) [hereinafter “Bunn/Wier, 2005”].

## Consolidate weapons and materials

The Task Force called for a dramatic reduction in the number of Russian military sites where weapons and weapons-usable materials are stored. Consolidating Russian weapons and materials in as few sites as possible, the Task Force concluded, would decrease the risk of theft and reduce the financial burden of maintaining high levels of security across multiple locations.

***Weapons consolidation:*** There is no direct evidence that U.S. efforts have led Russia to consolidate the number of warhead sites. Russian General Colonel Igor Valynkin, however, has made public statements that the Russian MOD has reduced the number of *permanent* storage sites by half in recent years—from an original 120 locations where U.S. security enhancement support was requested, down to around 60 sites today.<sup>20</sup>

***Materials consolidation:*** Since 1999, the United States has worked with Russia to consolidate sites that store fissile materials through DOE’s Materials Consolidation and Conversion program. The goal of the program is to remove 29 metric tons (MTs) of potentially vulnerable HEU from 55 facilities. From FY 2001 to FY 2004, the United States facilitated the removal of 3.2 MTs of HEU from Russian sites.<sup>21</sup>

The pace of U.S.-sponsored efforts to promote the consolidation of Russia’s stockpile of HEU, however, has remained constant since the release of the Baker-Cutler findings. Through FY 2001, the United States had facilitated the removal of an average of 1.1 MTs of HEU per year from Russian facilities; since then, it has averaged 1.07 MTs.<sup>22</sup> At the current pace, it would be another 22 years before the job is complete. (see Fig 5). Individual Russian site managers often resist the removal of materials from their facilities because they see removal as a threat to their jobs, stature, and authority.

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<sup>20</sup> The Russian Defense Ministry’s (MOD) 12th Main Directorate—known by its Russian acronym “GUMO”—is responsible for the physical protection and safety of nuclear weapons, including during transportation. The current estimate of the size of the overall Russian nuclear arsenal is 16,000 warheads—including both tactical and strategic weapons in active, operational, and indeterminate status. See Robert S. Norris and Hans M. Kristensen, “Russian nuclear forces, 2005,” *Bulletin of the Atomic Scientists*, Vol. 61, No. 02, pp. 70-72 (March/April 2005), available at [http://www.thebulletin.org/article\\_nn.php?art\\_ofn=ma05norris#2](http://www.thebulletin.org/article_nn.php?art_ofn=ma05norris#2).

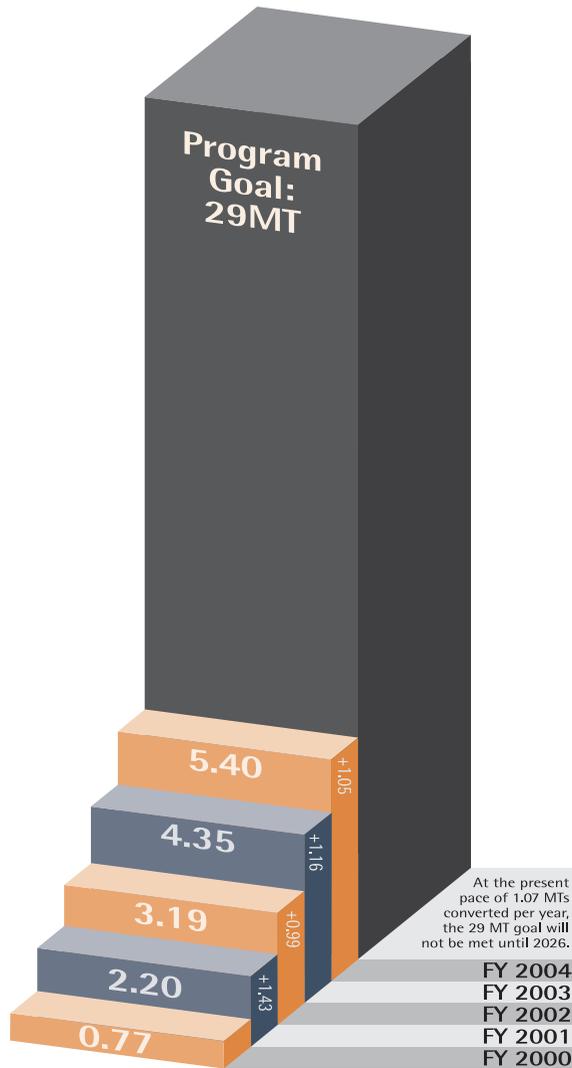
<sup>21</sup> See Department of Energy, “Congressional Budget Request, FY 2002”; “Congressional Budget Request, FY 2006,” p.485.

<sup>22</sup> See Department of Energy, *Congressional Budget Request, FY 2006*; *Congressional Budget Request FY 2005*; *Congressional Budget Request FY 2004*; *Congressional Budget Request, FY 2003*.

**Figure 5**



## 20 Years to Go: Converting HEU to LEU In Metric Tons



Sources: Department of Energy Congressional Budget Requests, FY 2002-2006

The Bush administration attempted to increase the pace of progress through its proposed Accelerated Materials Disposition initiative for FY 2004. Among other measures, the initiative would have significantly increased the pace of progress to 5 tons per year. Congress denied the request.

## Accelerate security upgrades

U.S. efforts focus on improving the security of locations where materials and weapons are stored, and on strengthening the security of weapons and materials while they are being transported from one facility to another. (see Box 2).

### Box 2 - The Human Dimension of Security

The mandate of the Baker-Cutler Task Force was to focus on the physical security of Russia's legacy arsenal of nuclear weapons and materials. Physical security is critical, but it is not sufficient: it must be accompanied by a security culture that prizes training, discipline and loyalty. Physical security measures are only as reliable as the human custodians of the protected weapons or materials. A 2002 poll of 600 Russian scientists with expertise relevant to the pursuit of weapons of mass destruction found that 21 percent would consider working for a rogue regime—most notably, North Korea.<sup>23</sup>

Since 2001, the United States has taken measures to help improve Russian security culture by facilitating the training of Former Soviet Union (FSU) security forces and providing former weapons scientists with incentives not to sell their expertise. Highlights of U.S. efforts to help Russia train its security forces include completion of a live-fire training facility. For more on this important dimension of security, we recommend an important 2004 study by scholars at the University of Georgia's Center for International Trade and Security.<sup>24</sup> We discuss U.S. involvement in efforts to prevent Russian scientists from selling their expertise separately, under Strategic Objective #4.

<sup>23</sup> Deborah Yarsike Ball and Theodore P. Gerber, "Will Russian Scientists Go Rogue? A Survey on the Threat and the Impact of Western Assistance," *PONARS Policy Memo 357* (November 2004) available at [http://www.csis.org/ruseura/PONARS/policymemos/pm\\_0357.pdf](http://www.csis.org/ruseura/PONARS/policymemos/pm_0357.pdf). See also Mike Nartker, "One-Fifth of Russian Scientists Surveyed Would Consider Working in Rogue States," *Global Security Newswire* (December 17, 2004) available at [http://204.71.60.36/d\\_newswire/issues/2004/12/17/65616416-06a5-49cf-80f4-fa357898b355.html](http://204.71.60.36/d_newswire/issues/2004/12/17/65616416-06a5-49cf-80f4-fa357898b355.html).

<sup>24</sup> Igor Khripunov & James Holmes (eds.), *Nuclear Security Culture: The Case of Russia* (December 2004), available at <http://www.uga.edu/cits/documents/pdf/Security%20Culture%20Report%2020041118.pdf>.

***Securing weapons and materials storage facilities:*** Both DOE and DOD are helping Russia boost the security of its nuclear warheads. There is no public data on the total number of Russian sites used to store nuclear weapons, though one informed expert estimate that there are 150-210 such sites.<sup>25</sup> We use this figure as our baseline. Since the Task Force released its report, U.S. efforts have increased the number of Russian nuclear weapons sites with what we refer to as “gold standard” security—modern, advanced security measures—from 25-26 sites in 2001 to 34 sites at the end of FY 2004.<sup>26</sup> The number of such sites with “quick-fix upgrades” ranges from 71 to between 88 and 110,<sup>27</sup> depending in significant part on the extent to which the Russians installed the 123 fencing sets provided by the United States before FY 2001.<sup>28</sup> The United States gained Russian agreement to cooperate on quick fix security upgrades at 17 additional Strategic Rocket Forces (SRF) sites and up to a dozen sites administered directly by the 12<sup>th</sup> GUMO--the Russian Ministry of Defense entity responsible for overseeing Russia’s entire nuclear complex. This development could result in an increase in the pace of work.<sup>29</sup>

The United States has sponsored the installation of gold standard security improvements at an average of approximately three additional Russian nuclear weapons storage sites per year, compared to a rough average of 3 ½ sites per year in the seven years before the Task Force released

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<sup>25</sup> Charles Thornton, presentation, Harvard University, October 24, 2003, *cited in* Bunn/Wier, 2005, p.34.

<sup>26</sup> This includes the installation of gold standard upgrades at eight Russian navy sites. The Department of Energy has determined that quick-fix upgrades are all that is required for an additional 21 navy sites, which would raise the total number of sites with gold standard security or its functional equivalent to 34. *See* Department of Energy, *Congressional Budget Request, FY 2006*. We do not count these as accomplishments made in the past four years, because evidence suggests that the quick-fix improvements that DOE now deems as sufficient were made entirely, or nearly so, before 2001. *See* Department of Energy, *MPC&A Strategic Plan, 2001*, p.10 (July 2001).

<sup>27</sup> This includes the installation of quick-fix upgrades at the final Russian naval warhead site where U.S.-Russian cooperative work was taking place and at two Russian Strategic Rocket Forces (SRF) nuclear sites.

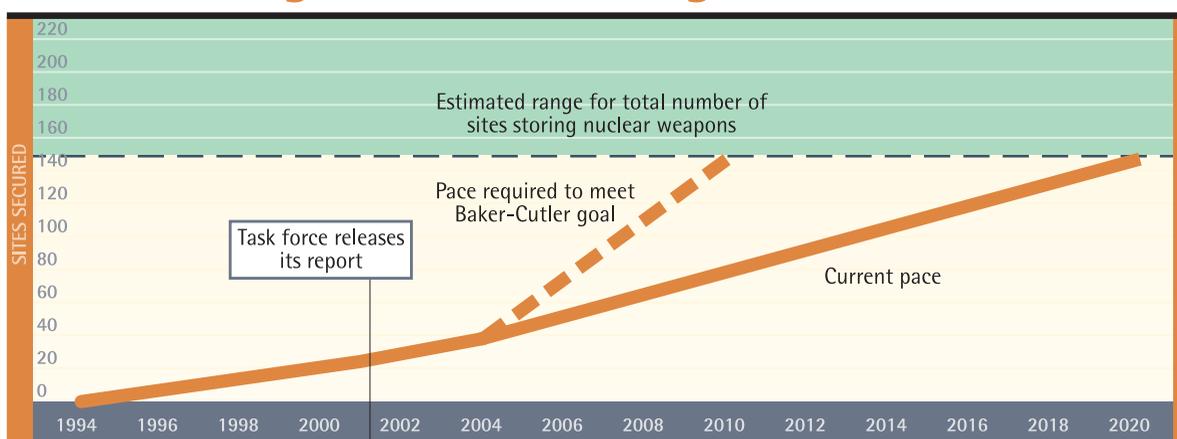
<sup>28</sup> Matthew Bunn and Anthony Wier, “Securing the Bomb: An Agenda for Action,” *Project on Managing the Atom/Nuclear Threat Initiative*, p.54 (May 2004), *available at* [http://www.nti.org/e\\_research/analysis\\_cnmwupdate\\_052404.pdf](http://www.nti.org/e_research/analysis_cnmwupdate_052404.pdf) [hereinafter Bunn/Wier, 2004]; Bunn/Wier, 2005, p.46.

<sup>29</sup> Moreover, according to a CIA report, Russian authorities twice thwarted terrorist efforts to reconnoiter nuclear weapon storage sites in 2002. National Intelligence Council, “Annual Report to Congress on the Safety and Security of Russian Nuclear Facilities and Military Forces” (December 2004), *available at* [http://www.cia.gov/nic/PDF\\_GIF\\_otherprod/russiannuke04.pdf](http://www.cia.gov/nic/PDF_GIF_otherprod/russiannuke04.pdf). Such evidence is anecdotal, but it does suggest that Russia is taking independent measures to strengthen the security of its nuclear weapons stockpile.

its report. For quick-fix upgrades on nuclear weapons storage sites, the average rate of progress dropped from approximately 10 per year before FY 2001 to between five and 10 after FY 2001. At the current pace, it could take between 12 and 37 years to fully secure these weapons (see Fig. 6). There are also important gaps in existing programs to secure Russian warheads that the United States has not filled (see Box 4).

**Figure 6**

## Accelerated Progress Required for Securing Warhead Storage Sites



Yearly data for progress prior to FY 2001 not consistently available, so “total work done” is calculated as an average.

Sources: Matthew Bunn and Anthony Weir, “Securing the Bomb 2005: The New Global Imperatives.” Statement of Ms. Gary L. Jones, “DOE’s Efforts to Secure Nuclear Material and Employ Weapons Scientists in Russia,” Statement before the Subcommittee on Emerging Threats and Capabilities, Committee on Armed Services, U.S. Senate, May 15, 2001, accessed online at: [www.gao.gov/new.items/d01726t.pdf](http://www.gao.gov/new.items/d01726t.pdf)  
 Department of Energy, FY 2006 Budget Request to Congress  
 Department of Energy, FY 2004 Budget Request to Congress

Since 2001, the U.S. has also sponsored the installation of gold standard security at 34 Russian buildings that store *fissile materials*—the “gunpowder” responsible for a nuclear explosion—raising the total number of secured buildings to 115.<sup>30</sup> The total number of such buildings, according to two reliable experts, is approximately 200.<sup>31</sup> This represents an increase in the total quantity of Russian fissile materials with U.S.-sponsored gold standard upgrades from 15 percent to 26 percent.

<sup>30</sup> Government Accountability Office, Statement of Ms. Gary L. Jones before the Subcommittee on Emerging Threats and Capabilities, Committee on Armed Services, United States Senate, *DOE’s Efforts to Secure Nuclear Material and Employ Weapons Scientists in Russia* (May 15, 2001), available at <http://www.gao.gov/new.items/d01726t.pdf>; Bunn/Wier, 2005, p.32.

<sup>31</sup> Bunn/Wier, 2005, p.32.

### **Box 3 – Addressing the Continued Threat of the Russian Nuclear Arsenal**

The United States has not taken concrete steps to address one major gap in existing nuclear security programs with Russia and another potential gap that is poised to emerge: the lack of information about the security of Russian tactical nuclear weapons, and the wider security gap over strategic nuclear weapons that the Treaty on Strategic Offensive Reductions could cause.

#### **Tactical (Short-Range) Nuclear Weapons**

Cooperative U.S.-Russian efforts to ensure that Russian nuclear weapons are secured to the so-called “gold standard”—modern, reliable security measures—have focused primarily on Russia’s strategic nuclear weapons, and not directly focused on Russia’s tactical nuclear weapons. Tactical nuclear weapons are typically lower-yield bombs that are used to destroy targets of tactical value in a war—such as the supply lines of invading armies. Strategic nuclear weapons tend to be physically large; tactical nuclear weapons tend to be relatively smaller and more portable. U.S. efforts to increase the physical security of Russian strategic nuclear weapons have incidentally increased the security of some tactical nuclear weapons, since the two are sometimes located in the same storage facilities. Beyond these limited facts, however, little is known about the security of Russia’s tactical nuclear weapons.

The comparatively small size and portability of these weapons make them especially tempting to terrorists. The United States government does not have an accurate picture as to where these weapons are currently stored, and it is unclear whether or not these weapons are secured to adequate standards. The National Defense Authorization Act for Fiscal Year 2004 includes a sense of Congress that “the United States should, to the extent the President considers prudent, seek to work with the Russian Federation to develop a comprehensive inventory of Russian tactical nuclear weapons.”<sup>32</sup> It required the President to submit a report “describing the progress that has been made toward creating such an inventory” to Congress within one year of the Act’s enactment.<sup>33</sup> That report is overdue. The U.S. also proposed several bilateral transparency measures on non-strategic nuclear weapons in 2004, which Russia has rejected.

*Continued on next page*

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<sup>32</sup> National Defense Authorization Act for Fiscal Year FY 2004 (PL 108-136), Section 3621(a).

<sup>33</sup> *Ibid.*, Section(B).

### **Box 3 – Addressing the Continued Threat of the Russian Nuclear Arsenal**

*Continued from previous page*

#### Strategic (Long-Range) Nuclear Weapons

The Treaty on Strategic Offensive Reductions is a positive, albeit limited, development. Under SORT, the United States and Russia agreed to limit the number of strategic nuclear weapons each may deploy on bombers and ballistic missiles to between 1,700 and 2,200. The United States is estimated to have 7,000 deployed strategic nuclear weapons and Russia 5,000 such weapons. They must achieve these reductions by December 31, 2012, at which point the treaty expires and both parties would be within their legal rights to increase their deployed arsenals beyond 2,200. SORT reductions do not address tactical nuclear weapons, stockpiled weapons, or weapons being refurbished.

SORT will eventually require Russia to remove several thousand warheads from its deployed arsenal and make arrangements to store or dismantle them. The United States and Russia have not instituted significant new parallel measures toward nuclear warhead storage to ensure the long-term security of these weapons. This distinguishes SORT from the reductions called for in the 1992 strategic arms framework and the 1993 START II Treaty. Under these arrangements, the United States and Russia tied nuclear reductions to enhanced cooperative threat reduction work in order to ensure that reductions would not result in inadequately secured warheads or materials. The failure of the United States and Russia to negotiate an accelerated effort to secure Russian strategic nuclear weapons, or at a minimum include verification measures in SORT that could provide the United States with assurances that Russia has the capacity to safeguard its weapons, is a gap in U.S. efforts to ensure that Russian nuclear weapons are not misdirected.

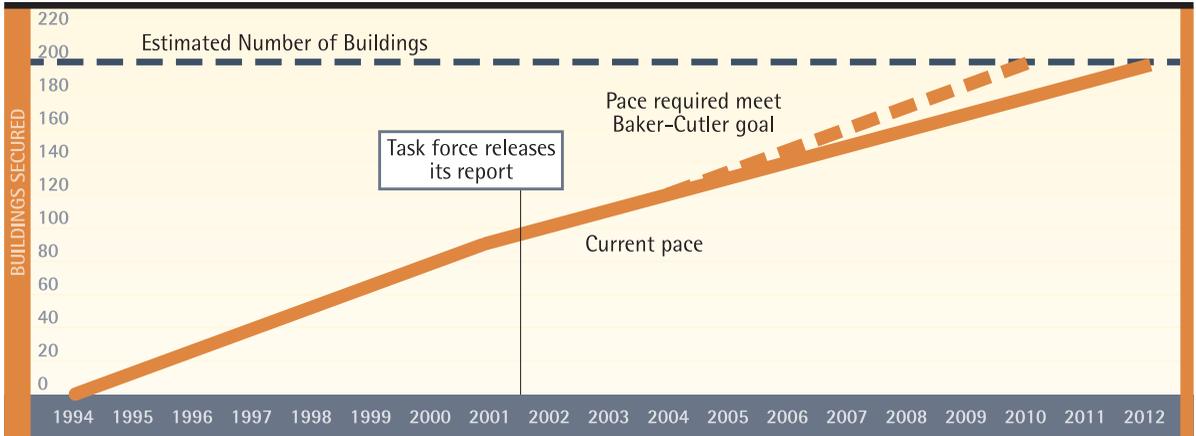
Since FY 2001 the United States has helped Russia install gold standard security at an average of 11 fissile materials storage buildings per year—roughly the same average number of buildings secured per year as before FY 2001. (see Fig. 7) If the United States keeps this pace, it will succeed in securing Russia’s materials by roughly 2012—just beyond the Task Force’s recommended deadline. Unfortunately, most of the remaining materials are believed to be housed in buildings to which the United States and Russia have been unable to negotiate access by U.S.-sponsored contractors, according to two noted experts.<sup>34</sup> Many of the buildings are

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<sup>34</sup> Bunn/Wier, 2005, p.31.

Figure 7

## Accelerated Progress Required for Securing Buildings with Weapons-Grade Materials



Comprehensive data on the number of buildings secured each year is not available, so figure represents average number of buildings secured over the course of the relevant time period.

Sources: Bunn, May 2005, p.32

Government Accountability Office, Statement of Ms. Gary L. Jones, "DOE's Efforts to Secure Nuclear Material and Employ Weapons Scientists in Russia," Statement before the Subcommittee on Emerging Threats and Capabilities, Committee on Armed Services, U.S. Senate, May 15, 2001, accessed online at: [www.gao.gov/new.items/d01726t.pdf](http://www.gao.gov/new.items/d01726t.pdf)

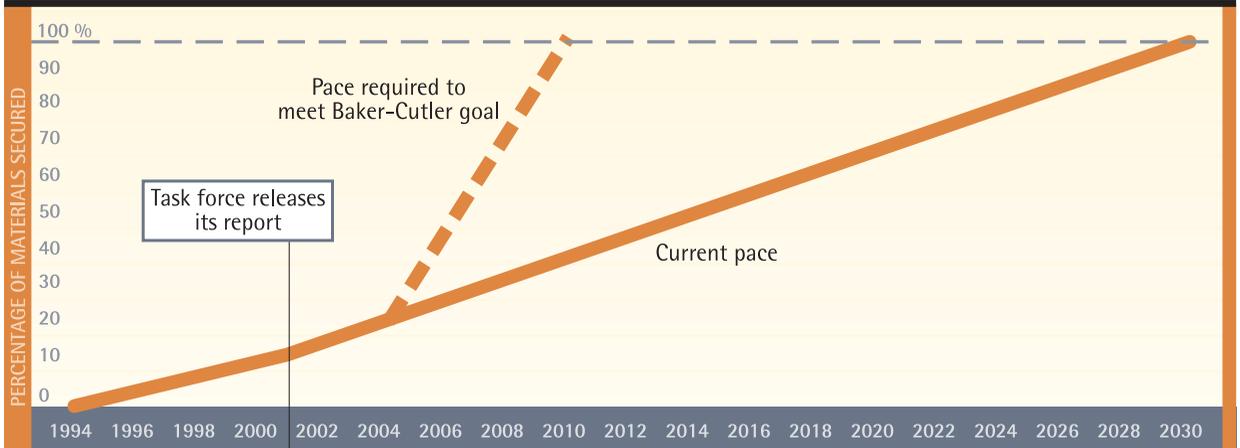
at sensitive nuclear weapons assembly and disassembly facilities, where especially large quantities of materials are believed to be stored. As a result, it is unclear whether the United States can sustain the 11 building per year pace.

Focusing on the estimated quantity of Russian materials secured helps clarify the pace of progress so far and the scale of cooperation that is still required. In the period before FY 2001, the United States secured an average of 2.1 percent additional materials per year. Since the Task Force released its report in 2001 the United States has secured, on average, an additional 3 percent of materials—a negligible increase in the pace of work. At this pace, Russia's materials will not be secured for another 25 years. (see Fig. 8)

These two estimates bracket the pace of progress, from an optimistic completion date of 2012 if the building metric is used, to a more pessimistic date of 2030 if the quantity of materials is used. The true pace probably lies somewhere in between. If the disputes over access to sensitive sites that currently prevent the United States from sponsoring work are resolved, the pace of progress could increase sharply. If these

Figure 8

## Accelerated Progress Required for Securing Weapons-Grade Materials



disputes are not resolved, however, it could be a decade or more before the job is completed.

***Securing weapons and materials in transit:*** Weapons and materials in transit pose a particularly attractive target for terrorists. As such, ensuring their security has become a critical aim of U.S. threat reduction and nonproliferation collaboration with Russia. Since 2002, the DOD warhead security program has contributed to security upgrades for warhead-carrying railcars, provided “supercontainers” for secure warhead transport and storage, supplied armored blankets to protect warheads from small-arms fire, and provided improved communication and tracking systems to allow the Ministry of Defense to respond rapidly to any accident or attack on a warhead transport. Since 2001, the United States has nearly tripled the number of transport and escort trucks, quadrupled the number of secure railcars, and increased by more than 35 times the number of secure overpacks it has given to Russia to safeguard the transportation of nuclear materials.<sup>35</sup>

<sup>35</sup> Data is based on FY 2003 levels. Compare Department of Energy, *MPC&A Strategic Plan, 2001*, p.10 (July 2001) with Department of Energy, *Congressional Budget Request, FY 2005*, p.453.

## Develop a reliable, modern accounting system for Russian nuclear warheads

Since 2001, the United States has made laudable progress towards implementing this goal. It finished testing the “Automated Inventory Control and Management System”—a modern warhead accounting system—and, as of FY 2004, had installed the necessary accounting equipment at 12 of 16 facilities earmarked for cooperation.<sup>36</sup>

## Secure the return of Russian-origin HEU from foreign reactors

On May 26, 2004, then-Energy Secretary Spencer Abraham announced the launch of the Global Threat Reduction Initiative (GTRI) to strengthen coordination over efforts to secure and, where possible, eliminate civilian use and stockpiles of HEU. On that date, the United States and Russia agreed to cooperate on the eventual removal of HEU from 17 of 20 Soviet-supplied reactors, with a target date of 2009.<sup>37</sup> The GTRI has identified dozens of facilities that pose a particularly high proliferation risk, and claims that it will repatriate all Russian-origin fresh HEU civilian research reactor fuel by the end of 2005 and all Russian-origin civilian spent fuel by 2010.

Since 2001, the United States has secured the return of fresh HEU from six Soviet-supplied facilities back to Russia, with half of the shipments occurring in FY 2004.<sup>38</sup> Efforts are reportedly underway to secure the eventual return of HEU from sites in another four countries by the end of FY 2005.<sup>39</sup> Prior to 2001, HEU had been returned from just two facilities. This marks an improvement over where these efforts stood in 2001, though the U.S. does not appear on track to meet the 2005 deadline for securing the return of fresh HEU.

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<sup>36</sup> Defense Threat Reduction Agency, *Cooperative Threat Reduction Annual Report to Congress, Fiscal Year 2006*.

<sup>37</sup> Transcript of Secretary Abraham and Russian Atomic Energy Minister Rumyantsev at Announcement of Joint Statement on Fuel Return (November 7, 2003), available at [http://www.pi.energy.gov/pdf/library/russia\\_transcript\\_110703.pdf](http://www.pi.energy.gov/pdf/library/russia_transcript_110703.pdf).

<sup>38</sup> Strengthening the Global Partnership Project, “Global Partnership Update,” No. 6 (January 2005), available at <http://www.sgppproject.org/publications/GPUUpdates/GPUUpdateJan2005.pdf>.

<sup>39</sup> Strengthening the Global Partnership Project, “Global Partnership Update,” No. 6 (January 2005), available at <http://www.sgppproject.org/publications/GPUUpdates/GPUUpdateJan2005.pdf>.

## Minimize the proliferation threat of Russian general-purpose nuclear submarines

Senator Lugar recently remarked that Russia's general-purpose nuclear submarines raise "nuclear proliferation concerns because of their nuclear reactors."<sup>40</sup> As of September 2004, 110 general-purpose subs await dismantlement, with additional spent nuclear fuel from 156 reactor cores stored at four sites.<sup>41</sup> Yet, "[t]he United States does not consider Russia's general purpose nuclear submarines to be a military or nuclear proliferation threat and, consequently, does not fund their dismantlement."<sup>42</sup> The U.S. has no program in place to address this threat, and has left the task to its allies in the G8 Global Partnership. As we explain below under Task Force Objective #5, p.47, however, the G8 Global Partnership has been slow to translate promises of support into concrete action.

### Recommendations:

The United States must work with Russia to secure nuclear weapons and materials. It should:

- **Significantly accelerate efforts to install "rapid" security upgrades on Russian facilities.** Rapid upgrades are a quick fix designed to remedy immediate vulnerabilities. The eventual goal should be securing all Russian materials and weapons to gold standard security levels. Additional funding would accelerate these critical efforts.
- **Promote consolidation of Russian materials by offering tailored incentives to existing storage sites to give up their weapons materials.** Consolidation would minimize the expense of storing Russian weapons materials. The United States and other Global Partnership countries must develop a flexible menu of financial, political, and other incentives to make it in these facilities' interests to give up their materials and lend their full support to consolidation efforts. U.S. programs to facilitate

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<sup>40</sup> Richard G. Lugar, "Aging Soviet subs are still a threat," *International Herald Tribune* (August 13, 2005).

<sup>41</sup> Cristina Chuen, "Submarine Dismantlement Assistance," *Nuclear Threat Initiative Issue Brief* (April 20, 2004), available at [http://www.nti.org/e\\_research/e3\\_43b.html](http://www.nti.org/e_research/e3_43b.html).

<sup>42</sup> Government Accountability Office, "Russian Nuclear Submarines: U.S. Participation in the Arctic Military Environmental Cooperation Program Needs Better Justification," *GAO-04-924*, p.3 (September 2003), available at <http://www.gao.gov/new.items/d04924.pdf>.

consolidation should have sufficient flexibility to address the unique nature of each case accordingly. Where necessary, Congress should act immediately to grant that authority.[insert reference]

- **Finance the design and construction of additional consolidated storage facilities for Russian nuclear warheads.** The United States should enlist the support of other Global Partnership countries including Russia for this expensive but vital effort. One such facility—at Mayak—cost approximately \$350 million.
- **Accelerate the Materials Control and Conversion program.** The President should resubmit to Congress his proposal to increase the pace of downblending under this program to 5 tons per year; Congress should grant the President’s request.
- **Allow U.S. global nuclear security programs to be integrated with G8 Global Partnership efforts.** Currently, the United States does not permit U.S. funding for global nuclear security programs to be combined with funding from other countries. This means that U.S. agencies must bear a larger share of implementation costs. The Congress should permit “commingling” in the context of the G8 Global Partnership to allow partner countries to take the lead in some areas, with appropriate accountability mechanisms to ensure that U.S. taxpayer dollars are prudently spent.
- **Exchange comprehensive inventories of tactical nuclear weapons.** As a first step towards verifying the security and eventual dismantlement of these weapons, the United States and Russia should share technical lessons learned in tracking weapons from “cradle to grave.” In keeping with the wishes of Congress as expressed in the FY 2003 Defense Authorization Bill, the administration should offer financial assistance to complete a comprehensive Russian inventory of weapons. This inventory should be followed by data exchanges between the U.S. and Russia and serve as a roadmap for the eventual elimination of these weapons as well as the secure storage and elimination of their composite materials.

## TASK FORCE OBJECTIVE #2: ELIMINATE EXCESS RUSSIAN HIGHLY ENRICHED URANIUM

In 1993, shortly after the fall of the Soviet Union, the United States recognized the risk that Russia's massive stockpile of inadequately secured highly enriched uranium (HEU) posed: a state or terrorist that acquired the materials would be in a position to build a nuclear weapon and threaten both countries' interests. The United States agreed to purchase 500 tons of weapons-ready HEU from Russia for diluting, or "downblending," into low-enriched uranium (LEU) and eventual civilian use in commercial reactors. Since its inception in 1993, the HEU Purchase Agreement, also known as the Megatons to Megawatts program, has disposed of more than 245 metric tons of bomb-grade HEU—the equivalent of 9,839 nuclear warheads—by diluting it into 7,225 metric tons of LEU fuel.<sup>43</sup>

The Task Force recognized that securing existing stockpiles of HEU is the most effective and least costly means of preventing nuclear terrorism. Without access to HEU, a terrorist would find it virtually impossible to assemble a nuclear device. It offered two specific recommendations for eliminating Russia's excess HEU:

- Expand Russian capacity for downblending to demilitarize excess HEU
- Accelerate downblending of HEU under the HEU Purchase Agreement

Four years after the Task Force released its findings, there has been no expansion of Russian downblending capacity and no acceleration of downblending under HEU Purchase Agreement.

### Expand Russian capacity for downblending.

There has been no such expansion, and there are no known plans to build such capacity in the future.

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<sup>43</sup> United States Enrichment Corporation, *US-Russian Megatons to Megawatts Program: Recycling Nuclear Warheads into Electricity* (June 30, 2005), available at [http://www.usec.com/v2001\\_02/HTML/megatons\\_fact.asp](http://www.usec.com/v2001_02/HTML/megatons_fact.asp)

## Accelerate downblending under the HEU Purchase Agreement.

In the four years since the release of the Baker-Cutler plan, the United States and Russia have downblended 120 metric tons of highly enriched uranium under this initiative. The LEU fuel produced by this effort provides electrical power to an average of one in ten American homes, businesses, schools and hospitals.<sup>44</sup> The program is a critical contribution to U.S. and international security: every pound of HEU neutralized by these efforts is one less pound potentially available to terrorists.

The United States has also made some modest advances in improving the coordination of its efforts to eliminate excess HEU with the launch of the Global Threat Reduction Initiative (GTRI) in 2004. The programs include initiatives to eliminate stockpiles of Russian and U.S.-origin HEU from sites around the world and convert civilian facilities that use HEU—such as research reactors—to LEU fuels.

But overall, the pace of work has not accelerated: the amount of materials downblended each year has remained constant at 30 metric tons since 2000.<sup>45</sup> United States law limits the amount of HEU that can be downblended each year under the Megatons to Megawatts program in order to avoid undercutting the market price of LEU. This restriction, however, has prevented the amount of HEU that is downblended each year from increasing, as called for by the Task Force. This leaves approximately 250 metric tons of material in storage and in a form highly desirable to terrorists.

In 2003, the president requested a \$30 million appropriation from Congress for an Accelerated Materials Disposition initiative to expedite the elimination of HEU that either the Megatons to Megawatts program is dealing with too slowly or that is deemed to be beyond the scope of that program. The initiative would have purchased an additional 1.5 tons of HEU per year for 10 years in order to create a strategic reserve of enriched uranium that would be used to remedy major supply disruptions. It would also have authorized the purchase of an additional 150 kilograms of HEU per year for 10 years to run HEU-fueled U.S. government research reactors. The request was denied by Capitol Hill, however.

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<sup>44</sup> See United States Enrichment Corporation, *U.S.-Russian Megatons to Megawatts Program*, available at [http://www.usec.com/v2001\\_02/HTML/megatons\\_howitworks.asp](http://www.usec.com/v2001_02/HTML/megatons_howitworks.asp)

<sup>45</sup> United States Enrichment Corporation, *Progress Report: U.S.-Russian Megatons to Megawatts Program* (July 2005), available at [http://www.usec.com/v2001\\_02/HTML/Megatons\\_status.asp](http://www.usec.com/v2001_02/HTML/Megatons_status.asp).

Moreover, the initial 500 tons designated for elimination under Megatons to Megawatts represents less than half the total estimated Russian stockpile. There has been no tangible progress toward including additional HEU under U.S.-Russian cooperative efforts since the Task Force issued its report.

## Recommendations:

The United States must work with Russia to eliminate excess Russian HEU. It should:

- **Explore development of an expanded capacity for diluting Russian HEU into low-enriched uranium (LEU).** Working with Russia and other countries in the G8 Global Partnership, the United States should develop options for accelerating the dilution of Russian HEU into LEU. For example, it is believed that with some relatively minor infrastructure improvements, Russia could double the current rate at which HEU is downblended.<sup>46</sup>
- **Secure additional funds to expedite the elimination of HEU.** The president should resubmit his request for an appropriation that expedites the purchase and storage of highly enriched uranium in Russia. Congress should grant that request.
- **Create a strategic stockpile of LEU.** To prevent the LEU created by an expanded downblending effort from disrupting the market for LEU, the United States should create a strategic stockpile of LEU. The LEU would stay in storage until the market could absorb it.
- **Ensure that GTRI program managers maintain adequate flexibility to offer tailored incentives to shut down or convert all HEU fueled research reactors.** To convince managers of facilities that use HEU in their research reactors to give up their HEU, GTRI should be empowered by Congress to offer tailored incentives, including science and technology collaboration where reactor conversion is complicated, overly costly, or technically unfeasible. Managers often resist giving up their HEU, seeing it as a valuable resource.

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<sup>46</sup> Matthew Bunn, *Reducing Excess Stockpiles: U.S.-Russian HEU Purchase Agreement* (2003), available at [http://www.nti.org/e\\_research/cnwm/reducing/heudeal.asp](http://www.nti.org/e_research/cnwm/reducing/heudeal.asp).

## TASK FORCE OBJECTIVE #3: MANAGE EXCESS RUSSIAN PLUTONIUM

Russia's stockpile of weapons-usable plutonium is an estimated 150 tons, enough for up to 25,000 additional weapons. In the 1990s, the United States and Russia reciprocally declared 50 metric tons of weapons-usable plutonium as excess. In 2000, they each agreed to eliminate 34 metric tons of it over the course of 20 years. Russia lacked the capacity to implement its obligation, so major infrastructure and considerable foreign investment was needed.<sup>47</sup>

Following protracted discussions with the Russians, the U.S. and Russia agreed in principle on a three-stage process that would lead ultimately to the elimination of the 34 tons. The first step would be to securely store existing stockpiles of material at secure facilities, such as the one built at Mayak, located in Russia's Southern Ural mountains. The second step would be bilateral or multilateral inspections to verify that the material is not diverted for weapons purposes. The third and final stage would be the final disposition of the material. In addition, Russia continues to operate three plutonium generating nuclear power reactors which must be closed down in order to eliminate production capacity throughout the country.

The Task Force offered four recommendations for managing Russia's excess plutonium:

- Store up to 100 metric tons of plutonium at the Mayak fissile materials storage facility
- Eliminate up to 100 metric tons of Russian plutonium by converting it into fuel for use in civilian reactors
- Prepare an inventory of Russia's total stockpile of plutonium
- Halt additional Russian production of plutonium

In the four years since the Task Force made these recommendations, the U.S. government has achieved none of these recommendations.

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<sup>47</sup> "NIS Nuclear and Missile Database, Russia: Plutonium Disposition Overview," *Nuclear Threat Initiative* (September 24, 2004), available at <http://www.nti.org/db/nisprofs/russia/fissmat/plutdisp/puovervw.htm>.

## Store up to 100 metric tons of plutonium at Mayak.

In December 2003, construction was finished on one of two planned wings at the Mayak Fissile Materials Storage Facility, a joint U.S.-Russian funded project to safely store excess bomb-grade material drawn from Russia's nuclear weapons complex. The facility has a design capacity of 50 tons of plutonium and 200 tons of highly enriched uranium. It is technically feasible, however, to store 100 tons of plutonium at the Mayak facility. Moscow is not under a legal obligation to store defined weapons usable material there, although in the planning phases the United States and Russia informally agreed that storing such materials would be the primary purpose of the facility.

But earlier in 2003, before the Mayak facility was completed, the United States let the bilateral agreement that laid out the terms of U.S. assistance for plutonium disposition expire over a dispute with the Russians over which party would be liable in the event of an accident or sabotage. An additional dispute arose in July 2003 when the Russian government declared its intent to store just 25 tons of plutonium at Mayak rather than the 50 tons originally planned.<sup>48</sup> As a result of these setbacks, no plutonium has been loaded into the facility.

## Eliminate up to 100 metric tons of Russian plutonium

In July 2005, the United States and Russia reached agreement on liability provisions that had previously blocked progress—a positive development that could put these programs on the right track.

Since the release of the Task Force's report, the United States and Russia have not eliminated any excess plutonium—even the 34 metric tons the United States and Russia agreed in 1998 to eventually eliminate. In 2003, the United States let the government-to-government agreement that specified the terms of cooperation over the 34 tons lapse over a disagreement with the Russians over liability. There has been some modest research and development towards plutonium disposition. In July 2005, the United States and Russia reached agreement on liability provisions that had previously blocked progress—a positive development that could put these programs on the right track.

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<sup>48</sup> Matthew Bunn, "Controlling Nuclear Warheads and Materials: Mayak Fissile Materials Storage Facility," *Nuclear Threat Initiative* (January 30, 2004) available at [http://www.nti.org/e\\_research/cnwm/securing/mayak.asp](http://www.nti.org/e_research/cnwm/securing/mayak.asp).

## Prepare an inventory of Russia's total stockpile of plutonium

There is still no comprehensive inventory of Russian plutonium as called for by the Task Force. Reports indicate, however, that the U.S. is pursuing, “an informal approach...on [verifying the size of] Russia's plutonium stockpile.”<sup>49</sup>

## Halt additional Russian production of plutonium

Russia's current stockpile of plutonium was produced by 13 reactors operated by the former Soviet Union. In 1987, the Soviet Union—and subsequently the Russian Federation—began shutting down some of these reactors, closing 10 of them within five years. The only progress made on halting additional Russian production of plutonium is an agreement in 2003 to shut down two of the remaining three reactors by 2005, and the third by 2006. The Department of Energy, however, has already reported a three-year delay in program implementation, pushing the shut-down dates to 2008 and 2011 respectively.

The plants produce power for their communities; to facilitate their shutdown the United States pledged approximately \$200 million to build replacement fossil fuel power plants between 2002 and 2005 alone.<sup>50</sup> The administration has sought funding through the Global Partnership to address the closure of one of these plants. That project will require \$100 million in international contributions. Despite pledges by Britain, Canada, and the Netherlands, however, a shortfall of \$71.4 million remains.<sup>51</sup> The Department of Energy has requested \$732 million in its FY 2006 request for this project—a 200 percent increase over the 2005 appropriation.

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<sup>49</sup> Matthew Bunn, “Controlling Nuclear Warheads and Materials: Monitoring Stockpiles,” *Nuclear Threat Initiative* (March 10, 2003) available at [http://www.nti.org/e\\_research/cnwm/monitoring/declarations.asp](http://www.nti.org/e_research/cnwm/monitoring/declarations.asp).

<sup>50</sup> Global Partnership Working Group (GPWG) Annual Report 2005, Consolidated Report Data 7/6/05 available at [http://www.fco.gov.uk/Files/kfile/GPWG Annual Report Annex 2005 Final revised 2015 20 Aug 2005.pdf](http://www.fco.gov.uk/Files/kfile/GPWG%20Annual%20Report%20Annex%202005%20Final%20revised%2015%20Aug%202005.pdf).

<sup>51</sup> The United Kingdom has pledged \$20 million, Canada has pledged \$7.4 million, and the Netherlands recently pledged \$1.2 million for a total non-U.S. G8 Partnership pledge of \$28.6 million. “Expectations Low for Advances on Nonproliferation at G8 Summit,” *Nuclear Fuel* (July 5, 2005), available at <http://www.sgpproject.org/Personal%20Use%20Only/G8GleneaglesSummit.html>.

## Recommendations:

The United States must reinvigorate efforts to ensure that Russia's excess plutonium is fully accounted for and secured. It should:

- **Work with Russia to conclude a comprehensive inventory of the total Russian plutonium stockpile.** Having such an inventory is vital to ensuring that each and every ounce of plutonium is accounted for and fully secured. The United States should offer technical and financial assistance to Moscow to complete this important project.
- **Develop a broad strategic plan for neutralizing excess Russian plutonium.** Plans to burn excess Russian plutonium as MOX fuel should not prohibit consideration of alternative solutions, including other plutonium-burning nuclear fuel technologies.
- **Conclude a formal agreement with Russia to fill Mayak to capacity.** The U.S. government should immediately conclude an agreement with Russia that would allow the Mayak facility to store any potentially vulnerable bomb-grade material and ensure that the site is used to its fullest potential in the shortest possible timeframe.
- **Fund efforts to shut down the remaining three plutonium-producing reactors.** The United States should press its counterparts in the G8 Global Partnership to fulfill existing pledges and commit additional resources. If adequate G8 partner funding cannot be secured, the United States should appropriate the necessary resources so that target dates do not slip further.

## TASK FORCE OBJECTIVE #4: DOWNSIZE THE NUCLEAR COMPLEX

During the Cold War, the Soviet Union operated a massive nuclear weapons complex consisting of hundreds of facilities and tens of thousands of scientists and technicians. Today, 10 cities with a combined population of 750,000 people remain walled off, the nuclear facilities they once housed crumbling under a lack of government support. Many of these facilities house significant quantities of bomb-grade materials. Fears that a disgruntled insider could steal or otherwise aid in the misdirection of HEU or plutonium to a terrorist organization or rogue state suggest that ensuring the shutdown of excess facilities and sufficient employment remain critical to U.S. and global security. Furthermore, the proliferation of only a handful of individuals with critical knowledge could mean a dramatic enhancement of a terrorist or rogue state's capacity to design and build a nuclear weapon.<sup>52</sup>

Recognizing these incumbent threats, the Task Force highlighted the urgency of eliminating excess nuclear weapons infrastructure and preventing Russian weapons expertise from leaving the country. The Task Force's five original recommendations for downsizing the Russian nuclear complex can be summarized into two more readily measurable, interrelated objectives:

- Eliminate excess Russian nuclear weapons infrastructure
- Accelerate efforts to prevent former Russian weapons expertise from proliferating<sup>53</sup>

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<sup>52</sup> Russia had four so-called serial warhead assembly/disassembly facilities in the closed cities of Sarov, Zarechny, Trekhgorny, and Lesnoy. See Igor Khripunov & James Holmes (eds.), *Nuclear Security Culture: The Case of Russia* (December 2004), available at <http://www.uga.edu/cits/documents/pdf/Security%20Culture%20Report%2020041118.pdf>.

<sup>53</sup> The Task Force's original five recommendations were to: a) "facilitat[e] Russian efforts to accelerate the shutdown of its weapons assembly, component fabrication, and materials production facilities"; b) "fund[] 'contract research' using existing DOE research and development funds aimed at spurring new technologies for use in cleaning up the U.S. weapons complex"; c) "work[] with Russia to ensure nuclear weapons scientists and workers are provided financial incentives for early retirement from the weapons complex"; d) "overhaul[] foreign and domestic lending practices to new businesses in the nuclear cities"; and e) "enhance[e] communication between the municipalities and the weapons institutes or facilities that are co-located with them in order to increase efficiency in the expenditure of resources." Baker-Cutler Task Force, p.28.

The United States government has made progress on implementing both recommendations, though there is considerable room for improvement.

## Eliminate excess nuclear weapons infrastructure

Since 2001, the United States has helped Russia make modest strides in downsizing this once-formidable weapons complex by building on efforts begun in the 1990s. The U.S.-funded Nuclear Cities Initiative (NCI) was designed to help Russia reduce the size of its nuclear weapons complex by converting or shutting down excess nuclear weapons facilities and developing alternative jobs for former employees. The NCI has established a presence in at least three of the 10 nuclear closed cities. Its efforts have led to the closure of one of Russia's four nuclear weapons assembly plants, in the nuclear city of Sarov. The Russian government has closed down a second in the nuclear city of Zarechnyy.<sup>54</sup> Over the next several years, the Russian government will continue to take independent steps to downsize its nuclear weapons complex.

From its earliest days, NCI was criticized for poor management and overall under-performance.<sup>55</sup> The program was found to be funding Russian scientists on a part-time basis, many of whom continued to work on Russia's weapons of mass destruction and receive a salary paid for by the Russian government. In addition, a disproportionate share of NCI funding was spent within U.S. national laboratories. Program inefficiencies combined with a lack of political and financial support has prevented NCI from achieving its full potential. Of greater concern is the failure within the NCI program design to account for a lack of business and international development expertise within the DOE implementing bureaucracy. Finally, the remote location of the nuclear cities combined with barriers to access erected by the Russian Federal Security Service (FSB) have made implementation of the NCI program especially challenging: according to two noted experts, these efforts have shut down only 7-8 percent of Russia's excess nuclear weapons complex.<sup>56</sup> While the Russian Federal Atomic Energy Agency (Rosatom) has its own conversion initiative operating within Russia's closed cities, additional funding and enhanced involvement of international development and business expertise could dramatically increase the pace by which facility shutdown occurs

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<sup>54</sup> Department of Energy, *The Nuclear Cities Initiative*, available at [http://www.nnsa.doe.gov/na-20/nci/about\\_success.shtml](http://www.nnsa.doe.gov/na-20/nci/about_success.shtml).

<sup>55</sup> United States General Accounting Office, "Nuclear Non-Proliferation: DoE's Efforts to Secure Nuclear Material and Employ Weapons Scientists in Russia, Statement of Ms. Gary L. Jones," *GAO-01-726T* (May 15, 2001), available at <http://www.gao.gov/new.items/d01726t.pdf>.

<sup>56</sup> Bunn/Wier, 2005, p.57.

and individuals are safely removed from the former weapons complex. Critical to the success of these efforts is greater access to these facilities.

## Prevent Russian weapons expertise from spreading

According to a 2004 study by the Lawrence Livermore National Laboratory, roughly 20 percent of Russian physicists, biologists, and chemists say they would consider working in rogue nations such as North Korea, Iran, and Syria.<sup>57</sup> As Russia continues to downsize its nuclear complex, it will create a large cache of jobless weapons experts. Some estimates suggest that 20,000-25,000 new civilian jobs will be needed in order to minimize the chance that Russian experts who lose their jobs may sell their expertise to terrorists or extreme regimes.<sup>58</sup> Yet, only 5,000-6,000 of the estimated 15,000-20,000 jobs required to absorb the nuclear complex's downsizing to date have been created.<sup>59</sup> Reductions in the Russian weapons capacity will add to the potential pool of weapons expertise that rogue regimes and terrorist groups might tap.

Efforts to redirect former weapons scientists, engineers and technicians have focused principally on short-term collaborative basic research grants with U.S. counterparts. While the value of basic research is undeniable and should be cultivated throughout the FSU, it is not a permanent solution for all former weapons researchers; new careers in commercially viable enterprises must be found. This is an area that existing efforts have largely neglected. A larger portion of former employees of the WMD complex could be absorbed within commercially sustainable efforts, thus reducing the burden on U.S. taxpayers and ensuring the long-term engagement of former weapons experts.

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<sup>57</sup> Deborah Yarsike Ball and Theodore P. Gerber, "Will Russian Scientists Go Rogue? A Survey on the Threat and the Impact of Western Assistance," *PONARS Policy Memo 357* (November 2004) available at [http://www.csis.org/ruseura/PONARS/policymemos/pm\\_0357.pdf](http://www.csis.org/ruseura/PONARS/policymemos/pm_0357.pdf). See also Mike Nartker, "One-Fifth of Russian Scientists Surveyed Would Consider Working in Rogue States," *Global Security Newswire* (December 17, 2004) available at [http://204.71.60.36/d\\_newswire/issues/2004/12/17/65616416-06a5-49cf-80f4-fa357898b355.html](http://204.71.60.36/d_newswire/issues/2004/12/17/65616416-06a5-49cf-80f4-fa357898b355.html).

<sup>58</sup> This figure represents an anticipated reduction from the estimated 35,000 individuals accounting for deaths and retirement.

<sup>59</sup> See Department of Energy, *FY 2005 Detailed Budget Justifications—Defense Nuclear Non-Proliferation*, vol. 1, p.459, available at <http://www.mbe.doe.gov/budget/05budget/content/defnn/n.pdf> and Bunn/Wier, 2005, p.56; Department of Energy, *FY 2005 Congressional Budget Request: National Nuclear Security Administration—Defense Nuclear Non-Proliferation*, p.459. The FY 2006 budget request of the Department of Energy restates the target figure for scientist redirect to just 9,000, down from the 15,000-20,000 targeted in previous years.

Where commercial sustainability has been a central focus, U.S. government investments of \$166 million into establishing viable commercial industries in Russia to employ former weapons scientists, engineers, and technicians have attracted \$178 million in private sector investment.<sup>60</sup> The vehicle for this investment, the Department of Energy's Initiatives for Proliferation Prevention, pairs Russian scientists and engineers who have sensitive knowledge with U.S. National Laboratories and private U.S. companies in research and development projects. Of the 100 completed IPP projects, 22 have been commercialized, with value-added of over \$24 million. Nine partners have attracted \$108 million in private venture capital and more than 1,000 new high tech jobs have been created in Russia and Ukraine as a result of IPP projects.<sup>61</sup>

According to the Department of Energy, the Russian Transition Initiative (under which NCI and IPP operate) met 53 percent of its targets through FY 2004 for trimming the number of personnel involved in nuclear weapons activities.<sup>62</sup> In 2004, more than 8,100 scientists, engineers and technicians were active in 146 cost-shared projects at 65 former Soviet weapons institutes under the IPP program.<sup>63</sup>

With funding levels stagnant for the IPP program, the program has reached capacity despite high demand from U.S. private industry.<sup>64</sup> When scientist redirection efforts were launched, the Department of Energy estimated that each job created in the nuclear cities might cost up to \$11,000. By those standards, an estimated \$220-\$275 million would be needed to redirect former weapons experts across the 10 closed cities.<sup>65</sup> Across all DOE programs working to stabilize employment for nuclear personnel in the FSU, from FY 2001 through the president's FY 2006 request, there has been an overall reduction in funding from \$51 million to \$37 million. There has been no significant expansion or acceleration of U.S. government efforts to develop alternative employment. The United States Industry Coalition (USIC), a nonprofit association of American companies

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<sup>60</sup> Office of Defense Nuclear Non-Proliferation, Department of Energy, *About NA-24*, available at <http://www.nnsa.doe.gov/na-20/ipp.shtml>.

<sup>61</sup> Ibid.

<sup>62</sup> Department of Energy, *Performance and Accountability Report: FY2004*, p.133.

<sup>63</sup> United States Industry Coalition, *Annual Report 2003-2004: A Decade of Partnerships, Building Prosperity and Security*, p.3 (2005), available at [http://cisa1.lanl.gov/Forms/FY03-04\\_final.pdf](http://cisa1.lanl.gov/Forms/FY03-04_final.pdf).

<sup>64</sup> Authors' interviews with USIC staff.

<sup>65</sup> Department of Energy, *A Department of Energy Report To The Congress On The Nuclear Cities Initiative* (1998), available at <http://www.ransac.org/new-web-site/related/govt/cabinet/doe/doereport.html>.

and universities participating in long-term nonproliferation efforts with the former Soviet Union, reports that current funding is inadequate, remaining largely static since FY 2003.<sup>66</sup>

## Recommendations:

The United States must strengthen efforts to downsize the Russian nuclear complex. It should:

- **Determine the scale of the continued proliferation threat posed by former Russian weapons scientists.** The United States, Russia, and other G8 Global Partnership countries should coordinate a comprehensive study to prioritize individuals and cost-share their engagement among U.S., G8 and Russian governments. Such a study would help ensure that resources are matched to potential threats, eliminate waste, and identify gaps. No such joint study has been undertaken.
- **Focus on creating commercially viable jobs for former weapons experts.** The United States should encourage greater private sector involvement in the development of innovative programs to employ former weapons experts. The U.S. government should also seek, wherever possible, appropriate non-governmental and international development expertise in program implementation. This will help maximize the prospects that new initiatives are commercially viable and hence sustainable.

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<sup>66</sup> For more on the Initiatives for Proliferation Prevention program, see the United States Industry Coalition website, *available at* <http://www.usic.net>.

## TASK FORCE OBJECTIVE #5: PLAN FOR RUSSIAN FINANCING OF SUSTAINABLE SECURITY

Since the Task Force released its strategy in 2001, there have been noteworthy strides in reducing the financial burden of these programs on the U.S. budget.

Since the Task Force released its strategy in 2001, there have been noteworthy strides in reducing the financial burden of these programs on the U.S. budget. When the Task Force released its report, the Russian economy was unstable and the prospects for Russia spending considerably more on nonproliferation were uncertain. Improvements in the Russian economy since then, however, have facilitated conditions for Russia to take on a greater share of financing the security of its nuclear weapons, materials, and expertise. Moreover, additional global partners have been identified to share the costs.

In 2001, the Task Force offered three recommendations for enabling Russia to finance its own security:

- Develop new revenue streams for financing Russian nonproliferation programs
- Seek specific commitments from Russia to fund security
- Begin detailed planning for the transition away from U.S. financial support

Bearing in mind the favorable economic circumstances that have enabled Russia to shoulder more of the costs, the U.S. government deserves credit for making progress toward at least two of the three recommendations.

### New revenue streams for financing Russian nonproliferation programs

The United States has proposed two new revenue streams: a debt-for-nonproliferation swap, and the G8 Global Partnership.

***Debt-for-nonproliferation swap.*** In 2002, the U.S. Congress proposed a pioneering debt reduction mechanism to encourage greater Russian investment in nonproliferation activities. Under this so-called “debt

for nonproliferation” model, the United States would relax repayment conditions on loans it had given to Russia. In exchange, Russia would devote resources to a nonproliferation trust that would fund nonproliferation projects. In 2002, the United States Congress gave the president the authority to pursue these debt swaps with the Russian government.<sup>67</sup> The administration has publicly supported the concept, but has not pursued any exchanges; improvements in the Russian economy have made the mechanism less attractive to all parties.

***G8 Global Partnership:*** The United States spearheaded the launch of the Global Partnership Against the Spread of Weapons and Materials of Mass Destruction in 2002, at the G8 Summit in Canada. The goal is to secure \$20 billion for use in Russian nonproliferation projects over the course of 10 years. The United States has pledged the most at \$10 billion, followed by a substantial commitment from Russia itself.

This significant step forward, however, still falls far short of the \$30 billion over 10 years that the Task Force included in its report for addressing the Soviet Union’s nuclear legacy. Nor is the \$20-billion dollar figure devoted exclusively to nuclear nonproliferation in Russia; it also includes programs to address the Soviet legacy of biological and chemical weapons, materials, and associated delivery systems, including environmental remediation. Thus far, the Global Partnership has secured pledges totaling just over \$17 billion, \$3 billion short of the 2002 target set by the G8. While additional pledges will doubtless be forthcoming, the pace at which existing pledges are being converted to projects on the ground has been slow: only 16% of the pledges have been turned into programs on the ground in Russia. (see Fig. 9).

Participation in the Global Partnership has prompted Russia to be more transparent about its national investments in nonproliferation, thus advancing a key objective of the Task Force. Nonetheless, the United States does not have a full picture of the totality of Russian expenditures and activities for securing the former Soviet weapons complex. This frustrates the ability of the United States to evaluate vulnerabilities and target resources towards resolving them.

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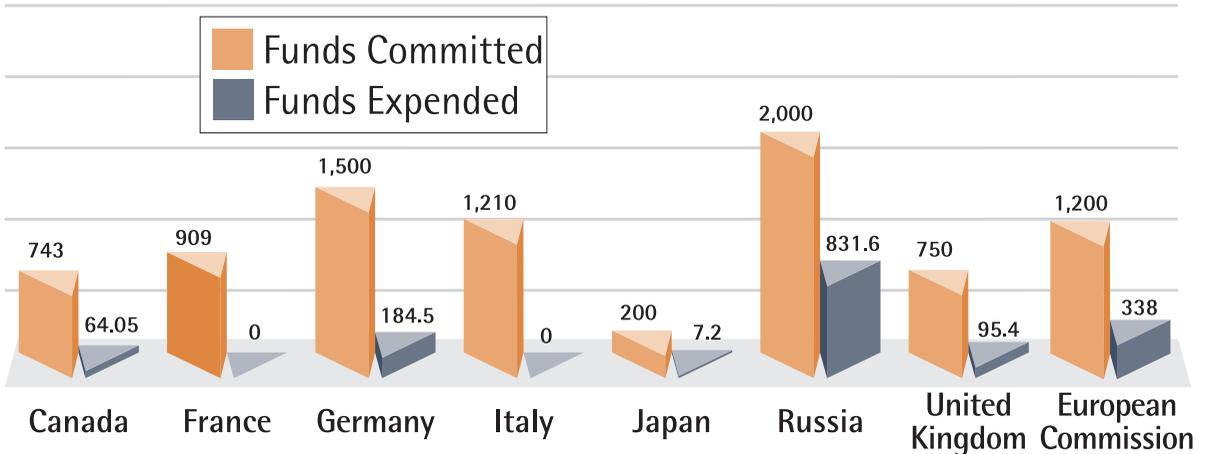
<sup>67</sup> See James Fuller, “Debt for Nonproliferation: The Next Step in Threat Reduction,” *Arms Control Today* (January/February 2002), available at [http://www.armscontrol.org/act/2002\\_01-02/fullerjanfeb02.asp](http://www.armscontrol.org/act/2002_01-02/fullerjanfeb02.asp).

**Figure 9**



## G-8 Pledges vs. Spending: Progress to Date

In Millions of U.S. Dollars, June 2002 through June 2006



G8 countries plus the European Commission are responsible for most of the non-U.S. and non-Russian pledges. More than a half-dozen non-G8 countries have also announced pledges to the Global Partnership.

Source: Global Partnership Working Group *Annual Report 2005, Consolidated Report Data, Annex A* (2005), available at: [http://www.fco.gov.uk/Files/kfile/PostG8\\_Gleneagles\\_GPWGAnnualReportAnnex2005.pdf](http://www.fco.gov.uk/Files/kfile/PostG8_Gleneagles_GPWGAnnualReportAnnex2005.pdf)

### Specific commitments from Russia to fund security

While the United States government has rightly criticized Russia in the past for a lack of transparency over its financial commitment to non-proliferation and threat reduction activities, Russia has pledged to spend \$2 billion on securing weapons, materials, and expertise in the former Soviet Union under the auspices of the G8 Global Partnership. High oil prices have buoyed the Russian economy, giving Russia greater discretionary income to spend on nonproliferation activities. As a result, Russia is in a far stronger position today to serve as a full partner in securing weapons, materials, and expertise than ever before.

## Detailed planning for the transition away from U.S. financial support

There is no public evidence that such detailed planning across the broad range of threat reduction and nonproliferation programs has taken place, though there have been very preliminary U.S.-Russian lab-to-lab discussions on how to transition DOE Materials, Protection, Control & Accounting.<sup>68</sup>

### Recommendations:

- **Seek specific, transparent funding commitments from Russia.** These commitments will enable the United States and other Global Partnership countries to better assess vulnerabilities and ensure that Russia is paying its fair share.
- **Work with other G8 allies to convert funding pledges into programs.** The President should work to continually ensure that the Global Partnership remain a regular agenda item at all relevant state visits and global forums to continue the pressure to convert pledges into programs.
- **Develop a strategy to progressively transition more responsibility to Russia.** A joint plan should be developed along with Russia and other G8 partners outlining a long-term strategy to transition nonproliferation security in Russia away from G8 financial support.

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<sup>68</sup> The authors are indebted to Bill Hoehn for this point.

## IDENTIFY AND INTERCEPT ILLICIT SHIPMENTS OF WEAPONS AND MATERIALS

The Task Force recognized that efforts to strengthen capacity to identify and intercept illicit shipments—such as the Department of Energy’s Second Line of Defense program, which helps Russia strengthen its border controls—had a role to play in reducing the chances that terrorists or extreme regimes acquire nuclear weapons. But it did not offer any specific recommendations, out of recognition that securing Russian weapons, materials, and expertise at their source is the surest way to prevent terrorists or extreme regimes from acquiring nuclear weapons.

Nevertheless, any new measure that reduces the chance that terrorists or extreme regimes acquire nuclear weapons is a positive development—especially in light of the slow progress towards fully securing Russia’s materials, weapons, and expertise. Since 2001, the Bush administration has made noteworthy progress strengthening U.S. and global capacity to identify and intercept illicit shipments of materials. It launched the Proliferation Security Initiative in May 2003 to improve intelligence and military cooperation to identify and intercept illicit shipments, and through that Initiative has spearheaded over a dozen multilateral practice exercises. The administration has also suggested that the PSI has resulted in the actual interdiction of weapons of mass destruction and missile technology, though these claims cannot be verified due to a lack of public information about them.

The United States has also signed shipboarding agreements with Cyprus, Croatia, Liberia, the Marshall Islands and Panama, which together have jurisdiction over a large proportion of ships traveling the high seas. These agreements streamline the procedures for legally boarding vessels traveling on the high seas. At the same time, however, the U.S. Senate has not ratified the United Nations Convention on the Law of the Sea (Oceans Treaty), which provides the legal framework that most of the rest of the world uses to govern the oceans. The failure of the United States to ratify the treaty could complicate our efforts to intercept suspected weapons shipments.

Finally, the United States has also taken steps to improve global capacity to identify illicit shipments of nuclear materials and strengthen port security. By and large, however, these efforts have not achieved their full potential. Serious technological hurdles, a lack of U.S. financial commitment, and poor coordination have hampered progress.<sup>69</sup> As noted in Box 1, a study by scholars at the Council on Foreign Relations and Stanford University found that a nuclear weapon shielded by a thin layer of lead stood a 90 percent chance of making it through U.S. Customs undetected.<sup>70</sup>

## Recommendations

- **Ratify the Oceans Treaty.** Senate ratification would ensure that the United States and other countries participating in the PSI are operating under the same set of rules and procedures. The Oceans Treaty codifies and clarifies legal rules that govern use of the oceans.
- **Strengthen port security.** The president should support and Congress should pass proposed legislation to use customs duties to increase port security funding to at least \$500 million per year—up from the current annual appropriation of about \$150 million. The United States should also take steps to equip within three years all shipping containers with on-board Global Positioning System tracking capability, a radiation detection device, tamper-proof secure seals, and a detailed computerized cargo manifest with prior imaging attached. Customs and Border Protection (CBP) should take immediate steps to improve and better coordinate existing container security programs.<sup>71</sup>

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<sup>69</sup> See Stephen Flynn, *America the Vulnerable: How Our Government is Failing to Protect Us from Terrorism* (2004).

<sup>70</sup> Lawrence Wein et al, “Preventing the Importation of Illicit Nuclear Materials in Shipping Containers,” available at <http://faculty-gsb.stanford.edu/wein/personal/container.pdf>.

<sup>71</sup> See “Protecting and Preserving an Open Society: The Challenge for the Next Secretary of Homeland Security,” *Center for American Progress* (2005); Joseph F. Bouchard, “New Strategies to Protect America: Safer Ports for a More Secure Economy,” *Center for American Progress* (2005); Stephen Flynn, *America the Vulnerable: How Our Government is Failing to Protect Us from Terrorism* (2004).

- **Work with the UN Security Council to develop a “fast track” for authorizing the interdiction of suspected weapons shipments on the high seas.** Under international law, vessels traveling the high seas can only be boarded if the country where the ship is registered (“flagged”) gives consent or the UN Security Council approves. The United States should seek to develop a “fast track” mechanism for securing Security Council authorization when flag states refuse to grant permission to board.
  
- **Continue to strengthen the PSI.** Intelligence cooperation and training exercises are especially vital to the effort.

## CONCLUSION

Four years after the Task Force released its report, there are fewer Russian materials available to terrorists to build a nuclear weapon and a smaller pool of former weapons experts who might be tempted to assist them. The United States has also strengthened international cooperation on nonproliferation work in Russia, cultivating new resources dedicated to the task. The United States is also better positioned today than it was in 2001 to identify and intercept illicit shipments of weapons and materials.

But the Bush administration and the U.S. Congress have not fully implemented the plan of the bipartisan Baker-Cutler Task Force. The Task Force called for an *acceleration* of progress towards securing vulnerable Russian materials. There has been no such acceleration. Indeed, in some areas, there has been a deceleration. Of the 19 specific recommendations the Task Force identified as part of its plan for securing materials, only five have registered significant progress toward completion. Moreover, the same obstacles that plagued progress in 2001 continue to hamper progress today: no clear White House leadership; unstable funding; and disputes over transparency. A new obstacle in the form of a dispute over liability has also emerged, threatening the future of these programs across the board.

The core recommendations of the Task Force are as relevant today as they were over four years ago. Russian nuclear weapons and materials must be secured; excess highly enriched uranium and plutonium must be eliminated; the Russian nuclear complex must be downsized; and a comprehensive plan for Russian financing of sustainable security must be completed. The Bush administration and the Congress must make securing these objectives a top national security priority. They must accelerate existing programs, especially those designed to secure fissile materials, and broaden their scope so that every weapon is secure and every gram of material is accounted for and protected as well as the gold at Fort Knox. To do so, the administration must clear the bureaucratic and legal obstacles that have hampered progress and establish a top-level White House post to coordinate these programs. The administration must work with Congress to ensure adequate funding and responsible oversight. To date, no administration and no Congress has addressed these threats with the level of seriousness that is warranted.

The politics of national security may have changed since 2001, but the threat identified by the Task Force has not. In our race to secure Russian nuclear weapons, materials, and expertise before terrorists acquire them, we have moved closer to the finish line in the four years since the Task Force released its report. Winning the race, however, requires not only that we run, but that we run faster than our terrorist competitors.

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## GLOSSARY

**Brain drain:** the emigration of personnel from former Soviet institutes, laboratories and facilities who were involved in weapons of mass destruction work.

**Cooperative Threat Reduction (CTR):** A series of programs, begun by the United States and Russia in 1991 and now involving many countries, that secure and/or dismantle weapons of mass destruction around the world as well as the materials and technology used to create such weapons. CTR is often also referred to as “Nunn-Lugar” (see below).

**Comprehensive upgrades:** Comprehensive upgrades—the “gold standard” for security over nuclear weapons and materials—build on the protections afforded by rapid upgrades. They may include installation of sophisticated electronic security and access measures and central alarm stations. These upgrades are more involved than rapid upgrades, and typically require 12 to 18 months to complete.<sup>72</sup>

**Container Security Initiative (CSI):** Launched in 2002, CSI is an initiative of the United States to improve the security of intermodal shipping containers—the standardized containers used to carry freight around the world and within the United States on trucks, trains, and ships. Under CSI, the United States works with the largest ports in the world to inspect containers before they arrive in the U.S. homeland. If countries agree to host U.S. inspectors at their ports, the United States reciprocates.

**Downblending:** the process of blending highly enriched uranium with low enriched uranium or natural uranium to decrease the overall enrichment level of the uranium in order make it less attractive from a proliferation perspective, i.e. not as readily useable in a weapon.

**Fissile Materials Cut-Off Treaty (FMCT):** Still in draft form, a treaty that aims to end the production of fissile materials for weapons. Some versions of the treaty would outlaw the production of weapons-grade materials, while other versions would only outlaw the production of weapons-grade materials expressly intended for use in a nuclear weapon. In addition, some versions have verification provisions. The version

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<sup>72</sup> Department of Energy, Office of Defense Nuclear Non-Proliferation, “About NA-24,” available at <http://www.nnsa.doe.gov/na-20/ipp.shtml>.

supported by the Bush administration has no verification provisions, and would only ban the production of materials expressly intended for use in a weapon.

**Fuel cycle:** The equipment and infrastructure needed to produce weapons-grade fissile materials.

**Gold standard security:** See “Comprehensive Upgrades.”

**G8 Global Partnership Against the Spread of Weapons and Materials of Mass Destruction:** An agreement, originating with the G8 but now expanded to most OECD countries, to help Russia (and more recently the Ukraine) manage the weapons of mass destruction legacy left by the former Soviet Union.

**Highly enriched uranium (HEU):** uranium that is enriched in the uranium-235 isotope to greater than 20 percent. For weapons, generally 90 percent enrichment is used. (Natural uranium, which cannot be used for weapons, contains only 0.7 percent uranium-235 and 99.3 percent uranium-238).

**International Atomic Energy Agency (IAEA):** A specialized United Nations organization responsible for promoting the peaceful and safe use of nuclear technology by facilitating international cooperation on nuclear issues. The IAEA is also responsible for monitoring states’ compliance with the Nuclear Nonproliferation Treaty by carrying out inspections of nuclear facilities.

**Low enriched uranium (LEU):** uranium that is enriched in the uranium-235 isotope to less than 20 percent.

**Mixed oxide fuel (MOX):** nuclear reactor fuel composed of a mixture of uranium and plutonium in oxide form. The plutonium replaces some of the fissile uranium, thus reducing the need for uranium ore and enrichment. This is a form of the fuel that would be used in plutonium recycle.

**Nunn-Lugar:** The common shorthand for the Nunn-Lugar-Domenici Cooperative Threat Reduction Program (CTR). It is used to refer to a series of programs, begun by the United States and Russia in 1991 and

now involving many countries, that secure and/or dismantle weapons of mass destruction around the world as well as the materials and technology used to create such weapons. Nunn-Lugar is often used interchangeably with CTR.

**Proliferation Security Initiative (PSI):** A U.S.-led partnership introduced in 2003 in which over a dozen countries have agreed to procedures and principles for cooperating to intercept weapons shipments.

**Quick-fix upgrades:** denotes initial security upgrades, such as installation of perimeter fencing and so-called “rapid upgrades.”

**Rapid upgrades:** upgrades that are done initially to provide a rapid increase in security of the nuclear material, which may include placing bricks in front of windows and installing equipment that monitors personnel and/or vehicles entering and leaving the facility.

**Strategic nuclear weapon:** Generally refers to high-yield, longer-range nuclear weapons designed for deterrence purposes, as opposed to tactical use in an ongoing battle.

**Tactical nuclear weapon:** Definitions vary, but generally refers to a diverse class of nuclear weapons that are portable, low-yield, and for use in battlefield scenarios.

**Weapons-grade:** nuclear material of the type most suitable for nuclear weapons, i.e., uranium enriched to 90 percent or more of uranium-235 or plutonium that is primarily plutonium-239.

**Weapons-usable (bomb-grade):** nuclear materials in a form that can readily be fabricated into nuclear weapons, without need for processes that alter the isotopic content. Highly specialized enrichment, separation, and /or chemical processes have already been completed to reach this condition, which leaves the material ready for conventional manufacturing operations (e.g. casting, alloying, drilling, machining, pressing) or conventional chemical processes. Weapons-usable material would include weapons-grade uranium, plutonium, as well as deuterium and tritium.



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