



**Preventing Nuclear Terrorism:  
Nuclear Security, the Nonproliferation  
Regime, and the Threat of Terrorist Nukes**

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## **List of Relevant Acronyms**

**ABM:** Anti-Ballistic Missile (Treaty)

**CPPNM:** Convention on the Physical Protection of Nuclear Material

**CTBT:** Comprehensive Test Ban Treaty

**CTR:** Cooperative Threat Reduction Program

**FMCT:** Fissile Material Cut-Off Treaty

**IAEA:** International Atomic Energy Agency

**ICC:** International Criminal Court

**ICSANT:** International Convention for the Suppression of Acts of Nuclear Terrorism

**NCA:** National Command Authority

**NNSA:** National Nuclear Safety Administration

**NNWS:** Non-Nuclear Weapons State(s)

**NPT:** Treaty on the Nonproliferation of Nuclear Weapons

**NWS:** Nuclear Weapons State(s)

**PAEC:** Pakistan Atomic Energy Commission

**PRP:** Personnel Reliability Program

**PSI:** Proliferation Security Initiative

**SALT:** Strategic Arms Limitation Talks

**SECDIV:** Strategic Export Control Division

**SPD:** Strategic Plans Division

**START:** Strategic Arms Reduction Treaty

**UTN:** Ummah Tameer-e-Nau

## **Executive Summary**

Contrary to what some may believe, the threat of a nuclear weapon detonating in a major city did not fade away with the end of the Cold War. Rather, in the aftermath of the Cold War, and particularly in the post-9/11 era, the nuclear threat facing the world has shifted to the possibility of terrorist groups stealing or receiving nuclear assets from a nuclear-armed state, and using those assets to execute a nuclear attack.

Though, of course, a terrorist nuclear weapon could originate from any of the nine states that currently possess a nuclear arsenal, three states, in particular, stand out as the most likely to serve as the source of a terrorist-controlled nuclear weapon: Russia, Pakistan, and North Korea.

In Russia, the threat lies primarily in the form of terrorist groups stealing nuclear materials from Russian facilities. The questionable security of Russian nuclear facilities has its roots in the immediate aftermath of the Cold War, when the Soviet collapse left Russia with the responsibility of securing the USSR's vast nuclear arsenal, a task for which the nascent Russian Federation was vastly underprepared for. Recognizing the threat that a porous Russian nuclear complex posed to the national security of the United States, the American government has, in the years since the end of the Cold War, partnered with Russia in a variety of nuclear security initiatives, in order to reduce the threat of nuclear theft from Russian facilities. However, while the security of the Russian arsenal is undoubtedly better than it was twenty years ago, much work remains to be done.

In Pakistan, the threat of nuclear materials falling into terrorist hands is a multi-faceted danger, composed of several different scenarios, such as (1) insiders within the Pakistani nuclear program proliferating nuclear assets and knowledge to terrorist groups; (2) a terrorist group stealing nuclear materials from a Pakistani facility; and (3) a radical Islamist group seizing control of the Pakistani government and nuclear arsenal, through a coup or democratic elections. In response, the Pakistani government has utilized a range of measures, with varying degrees of

success, to enhance the physical security of its nuclear facilities and prevent illicit collaboration between nuclear personnel and terrorist groups. In addition, the Pakistani government has engaged with the US government on several nuclear security initiatives, though a lack of transparency between the two governments has hindered the effectiveness of these programs.

The North Korean nuclear threat manifests itself primarily in the possibility of the Kim regime providing nuclear assets to terrorist groups, either directly or indirectly. In the past twenty years, North Korea has had a decidedly antagonistic relationship with the global nuclear nonproliferation regime, a relationship that, when coupled with the country's isolation on the diplomatic stage, has raised concerns that the Kim regime may feel that it has nothing to lose by proliferating nuclear weapons. The United States has responded to this threat by both engaging with North Korea in diplomatic talks, and by overseeing interdiction efforts to prevent North Korea from spreading its nuclear assets to outside agents.

Clearly recognizing the threat that nuclear proliferation poses to global security, the international community has, over the course of more than fifty years, constructed a framework to prevent the spread of nuclear weapons. Two of the most important elements of this framework are the Nuclear Non-Proliferation Treaty (NPT) and the International Atomic Energy Agency (IAEA).

The NPT is an international treaty that, originally, sought to limit the possession of nuclear weapons to five recognized nuclear weapons states (NWS): the US, the Soviet Union, China, the United Kingdom, and France. With all but four countries party to the treaty, the NPT has played an integral role in limiting the spread of nuclear weapons and advancing nuclear nonproliferation as a global norm. However, despite these positive results, the NPT has also proven to be flawed in several key ways. For example, it does not include a mechanism for sanctioning non-compliant states; it includes a clause (Article X) that allows states to withdraw from the treaty with essentially no consequences; and while it has helped to prevent

the spread of nuclear weapons, it has largely failed to convince existing NWS to reduce the size of their arsenals.

The IAEA, meanwhile, is the agency charged with actually verifying that states are obeying the terms of the NPT. Like the NPT, the IAEA has struggled with the issue of non-compliance, as it only possesses the mandate to refer non-compliant states to the United Nations. In addition, the more stringent elements of the IAEA's verification framework are not mandatory, making it much more difficult for the agency to definitively confirm that a state's nuclear program is being utilized in accordance with the terms of the NPT.

The issue of preventing nuclear terrorism is a complex one, but fortunately, as evidenced by the preceding paragraphs, a basic foundation of national, regional, and international initiatives to improve nuclear security already exists. Thus, accomplishing this objective will require building on existing efforts, rather than starting entirely anew.

Any effort by the international community to decrease the risk of nuclear assets falling into terrorist hands must be based on achieving two objectives: (1) preventing additional countries from acquiring nuclear weapons or weapons-grade materials; and (2) securing existing stockpiles of nuclear weapons and materials.

In order to achieve the first objective, the international community must first take steps to strengthen the NPT and IAEA. First, the international community should work to institute a standardized noncompliance mechanism to enforce the NPT/IAEA framework. With a standardized mechanism in place, this framework would be more likely to deter states from utilizing their nuclear programs in ways inconsistent with the principles of the NPT. Second, the international community must re-examine Article X of the NPT, which allows states to withdraw from the treaty with minimal sanctions. Ideally, both of these sub-objectives could be accomplished through the UN Security Council. For example, if the Security Council issued a generic, binding resolution declaring noncompliance with or withdrawal from the NPT to be a threat to international peace, there would be a greater

incentive for Security Council states to take decisive actions against states that threaten the world's nuclear stability. Third, the world's NWS must go beyond merely paying lip service to their commitments to Article VI of the NPT, which binds them to pursue efforts toward nuclear disarmament. Though some modest strides have been made in this arena, the NWS have, on the whole, failed to take any steps suggesting that they believe their Article VI obligations to be of true importance. Such an attitude undermines the legitimacy of the NPT/IAEA framework as a whole, and thus is detrimental to the cause of containing the world's nuclear materials. Finally, the international community must work to ensure that all countries are subject to the most stringent levels of IAEA oversight. In this regard, the United States must take a leading role, using its diplomatic and economic clout to compel reluctant states to accept such standards.

Furthermore, the US and the international community must also explore means of deterring nuclear proliferation that lay outside of the NPT/IAEA framework. Numerous such means certainly exist. For instance, contract sanctions would involve major financial powers, such as the US and UK, declaring all contracts with a given government to be illegitimate, and could thus be used to put economic pressure on states that are noncompliant with the NPT. In addition, the international community should work to designate illicit nuclear proliferation as a crime against humanity, as such a designation would further deter would-be proliferators, and increase the political costs incurred by governments that turn a blind eye to illicit proliferation.

Finally, the international community should increase Iran's incentives to disassemble its nuclear program. The best way to accomplish this would be a US-oriented "grand bargain" with Tehran, offering the Iranian government diplomatic normalization, economic assistance, and strictly-civilian nuclear equipment in exchange for the dismantling of its nuclear program.

Meanwhile, in order to secure existing stockpiles of nuclear materials, the international community could start by ratifying the 2005 amendment to the



Convention on the Physical Protection of Nuclear Material (CPPNM), as well as the International Convention for the Suppression of Acts of Nuclear Terrorism. These two conventions would establish common standards for domestic nuclear security and enhance international cooperation in the realm of preventing nuclear terrorism, and thus constitute a common-sense step towards keeping global nuclear stockpiles secure.

Second, the United States must continue its existing nuclear security policies towards Russia, Pakistan, and North Korea. Though US involvement in the sphere of nuclear security has not always been perfect, American funding and engagement will remain critical in the coming years to ensuring that these countries' nuclear assets do not fall into the wrong hands.

Finally, the US should enhance its nuclear attribution capabilities, in order to deter states from "losing" nuclear weapons and materials. Nuclear attribution refers to a scientific process by which the source of nuclear material can be ascertained. Thus, heightened US capabilities in this field would force states to assign a higher level of priority to nuclear security, because if a terrorist group stole and detonated one of their nuclear weapons, or stole nuclear materials that were later used in a terrorist weapon, the US would be able to determine that weapon or material's source, and take retributive action accordingly.

It is clear that the specter of a terrorist-controlled nuclear weapon is a serious threat. However, what is also clear is that there exist concrete steps that the international community can take to decrease the possibility of this threat becoming a reality. As detailed above, a combination of US and international efforts can be undertaken to improve global nuclear security and prevent nuclear assets from falling into the wrong hands.

This paper is divided into five sections. Following Section 1's short introduction, Section 2 will provide a brief historical overview of the Russian, Pakistani, and North Korean nuclear programs, analyze how the threat of nuclear assets falling into terrorist hands manifests itself in each country, and explore

policies that the US has adopted to negate this threat. In addition, this section of the paper will provide an overview of nuclear security in nuclear weapons states (NWS) besides Russia, Pakistan, and North Korea; Iran will also be discussed in this portion of the paper. Section 3 will offer an analysis of the global nuclear nonproliferation regime, and of existing international efforts to enhance the world's nuclear security. Section 4 will provide policy recommendations relating to how the US and the international community can further work to ensure that nuclear materials and technology do not fall into terrorist hands. Finally, Section 5 will end the paper with some concluding thoughts about the future of global nuclear security, and the importance of protecting the world from the threat of terrorist-controlled nuclear weapons.

## **Section 1: Introduction**

Over the years, the NNSA [National Nuclear Security Administration] has identified approximately 220 buildings at fifty-two sites in Russia that are in dire need of treatment. That's a lot, and as a result, actually there are two treatments. The first is a stop-gap measure called a "rapid upgrade" ...The second is a long-term fix called a "comprehensive upgrade" ...[Knowledgeable observers] say that about a third of the identified buildings have yet to be given even rapid upgrades, [and] that these contain about half of Russia's entire fissile-material stock...<sup>1</sup>

The Pakistani military, intelligence, and nuclear establishments are not immune to rising levels of extremism in the country. There is a lethal proximity between terrorists, extremists, and nuclear weapons insiders...Purely in actuarial terms, there is a strong possibility that bad apples in the nuclear establishment are willing to cooperate with outsiders for personal gain or out of sympathy for their cause.<sup>2</sup>

North Korea would sell just about anything to anyone, so in that sense they're a very large proliferation threat.<sup>3</sup>

For more than sixty years, the threat of a nuclear weapon exploding in a major city has loomed over the world. During the Cold War, this threat manifested itself in concerns that tensions between the United States and Soviet Union would spark a nuclear exchange with horrendous consequences for mankind. In the aftermath of the Soviet Union's demise, however, the nature of the nuclear threat has shifted. While the possibility of nuclear war between two nation-states should not be discounted entirely, the current reality is that terrorist groups, rather than organized militaries, are the entities most likely to execute a nuclear attack.

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<sup>1</sup> William Langewiesche, "How to Get a Nuclear Bomb," *The Atlantic*, (December 2006), <<http://www.theatlantic.com/magazine/archive/2006/12/how-to-get-a-nuclear-bomb/5402/#>> [accessed 11 July 2012]; pp 7-8.

<sup>2</sup> Rolf Mowatt-Larssen, "Nuclear Security in Pakistan: Reducing the Risks of Nuclear Terrorism," Belfer Center for Science and International Affairs, Harvard University, (1 July 2009) <[http://belfercenter.hks.harvard.edu/publication/19191/nuclear\\_security\\_in\\_pakistan.html](http://belfercenter.hks.harvard.edu/publication/19191/nuclear_security_in_pakistan.html)> [accessed 12 July 2012]: "Collaboration Scenarios."

<sup>3</sup> Jeffrey Lewis (Director, East Asia Nonproliferation Program, Martin Center for Nonproliferation Studies, Monterey Institute of International Studies), interview by Jayshree Bajoria (Senior Staff Writer, Council on Foreign Relations), (4 December 2010), <<http://www.cfr.org/proliferation/north-korea-iran-nuclear-cooperation/p23625>> [accessed 9 July 2012].

Of course, terrorists are highly unlikely to develop and assemble a nuclear weapon independently. After all, the development of nuclear weapons is a time-consuming and resource-intensive endeavor, requiring expertise unavailable to most terrorist organizations. Rather, the real danger lies in a terrorist organization either stealing a nuclear weapon or weapons-grade material from a nuclear-armed state, or being on the receiving end of a transfer of nuclear assets from such a state.

The threat of nuclear materials and technology falling into terrorist hands by such means is very real, and is one that this paper will seek to analyze. In particular, this paper will focus on three current members of the nuclear weapons club<sup>4</sup> that represent the most likely sources for a terrorist-controlled nuclear weapon: Russia, Pakistan, and North Korea. Due to a range of factors, ranging from insecure facilities to radicalized personnel, these three states stand out as the most prominent threats to serve as facilitators, intentional or not, for an act of nuclear terrorism. However, while the prospect of nuclear assets from these three countries falling into terrorist hands is a serious threat, it is one that can be overcome through a combination of efforts by the states themselves, the United States, and the broader international community.

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<sup>4</sup> For the purposes of this paper, the “nuclear weapons club” will refer to the eight countries that have successfully detonated nuclear weapons (the United States, Russia, China, United Kingdom, France, India, Pakistan, and North Korea), as well as Israel, which is widely assumed to possess a nuclear arsenal.

## **Section 2: The Most Plausible Sources for Terrorist-Controlled Nuclear Weapons**

### **Russia**

#### ***Historical Background and Overview of Nuclear Program*** <sup>5</sup>

In 1949, the Soviet Union became the second member of the nuclear weapons club, detonating a plutonium device in Semipalatinsk, Kazakhstan. Over the next forty years, the USSR poured massive amounts of manpower and resources into its nuclear program, with the size of its arsenal peaking in 1986, with a total of 45,000 weapons.<sup>6</sup> After the end of the Cold War, Russia inherited the majority of the former Soviet Union's nuclear weapons establishment, and currently possesses 8,500 total warheads,<sup>7</sup> making it the world's largest nuclear power.

For the first two decades of the nuclear age, the USSR and the US engaged in various forms of nuclear brinksmanship, threatening one another with nuclear strikes in such instances as the 1956 Suez Crisis and the 1962 Cuban Missile Crisis. However, this period of nuclear tension eventually gave way to the détente of the late 1960s and 1970s, which saw the USSR and US ratify the Nuclear Non-Proliferation Treaty (NPT) and engage in two major rounds of bilateral arms control talks. The first of these dialogues, the Strategic Arms Limitation Talks (SALT), yielded the Anti-Ballistic Missile (ABM) Treaty and the Interim Agreement on Certain Measures with Respect to the Limitation of Strategic Offensive Arms. This

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<sup>5</sup> All information in this section is drawn from the following two sources, unless otherwise noted: "Russia Country Profile: Overview," (Washington, DC: Nuclear Threat Initiative 2012), <<http://www.nti.org/country-profiles/russia/>> [accessed 17 July 2012]; "Russia Country Profile: Nuclear," (Washington, DC: Nuclear Threat Initiative, 2012), <<http://www.nti.org/country-profiles/russia/nuclear/>>, [accessed 17 July 2012].

<sup>6</sup> Richard L. Garwin, "Nuclear Weapons in the 21<sup>st</sup> Century: Prospects and Policy," (presentation made at Henry Kendall Memorial Symposium in Cambridge, MA, 23 October 23, 1999); <<http://www.fas.org/rlg/102599nw21.htm>> [accessed 2 August 2012].

<sup>7</sup> "Status of World Nuclear Forces," Federation of American Scientists, (2011), <<http://www.fas.org/programs/ssp/nukes/nuclearweapons/nukestatus.html>> [accessed 4 February 2012].

dialogue was eventually followed by the SALT II talks, which led to a bilateral reduction in weapons delivery systems.<sup>8</sup>

Since the end of the Cold War, the Russian Federation has maintained the Soviet Union's commitment to arms control and nonproliferation. It has continued its support for the NPT, and engaged with the US on additional arms control dialogues, culminating in the 2011 ratification of the New START treaty, in which the two countries agreed to hard limits on the number of strategic warheads deployed by each country.

### ***The Nature of the Nuclear Threat***

For Russia, the threat of nuclear assets falling into terrorist hands lays primarily in the form of terrorist groups stealing nuclear materials from Russian facilities—in other words, the “loose nukes” problem. This concern has its origins in the aftermath of the Soviet Union's collapse, when Russia essentially inherited the Soviet nuclear weapons complex. Gaining possession of this infrastructure meant that Russia was responsible for “the task of controlling, accounting for, and securing the Soviet nuclear legacy,” along with “ensuring the safety and security of weapons and weapons-related materials located at dozens of sites throughout the country.”<sup>9</sup>

Needless to say, in the chaotic period following the Soviet collapse, the Russian government was vastly underprepared for this monumental task. The financial tumult of this era left few funds available for the nuclear complex, a reality which led to the need for upgraded security being largely ignored, as some facilities struggled to even pay their employees' salaries.<sup>10</sup> In a 1998 article entitled, “Loose Nuke Fears: Anecdotes of the Current Crisis,” Matthew Bunn documented the appalling state of security within Russia's post-Soviet nuclear infrastructure. The stories detailed by Bunn are truly shocking, including descriptions of security

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<sup>8</sup> The SALT II agreement would ultimately collapse within a decade, with the US withdrawing from the treaty after President Reagan claimed that the Soviet Union had failed to obey the agreement's terms.

<sup>9</sup> “Russia Country Profile,” op cit., “Soviet Nuclear Legacy.”

<sup>10</sup> Ibid.

personnel assaulting each other, plutonium stockpiles being left “totally unguarded,” and guards leaving their posts to forage for food.<sup>11</sup>

Furthermore, the lack of security at many Russian nuclear facilities was repeatedly exploited by those seeking to acquire nuclear materials. A 1997 report by Graham Allison detailed six incidents of nuclear theft in Russia from 1992 to 1997, and pointed out the startling fact that “more fissile material is known to have been stolen from the former Soviet Union [in that time period] than the United States managed to produce in the first three years of the Manhattan Project.”<sup>12</sup> This trend did not come to a stop after 1997, either, as Chechen rebels were able to steal nuclear materials from a facility in southern Russia in 2002.<sup>13</sup>

### ***US Involvement***

Recognizing the serious threat that Russian “loose nukes” could pose to US national security, the American government embarked on a series of cooperative ventures with the Russian nuclear establishment in the years after the end of the Cold War, an effort which continues to this day. The US investment in Russian nuclear security is currently the largest part of American aid to Russia, and is aimed at two objectives: (1) helping Russia to consolidate and secure its nuclear warheads, along with their delivery systems and (2) securing Russia’s stocks of nuclear fissile materials.<sup>14</sup>

A large portion of US nuclear security aid to Russia comes as part of the Nunn-Lugar Cooperative Threat Reduction Program (CTR), established in 1991.<sup>15</sup> Named for US Senators Sam Nunn and Richard Lugar, CTR is an initiative that aims

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<sup>11</sup> Matthew Bunn, “Loose Nuke Fears: Anecdotes of the Current Crisis,” Belfer Center for Science and International Affairs, Harvard University, (1 January 1998), <[http://belfercenter.hks.harvard.edu/publication/2698/loose\\_nukes\\_fears.html](http://belfercenter.hks.harvard.edu/publication/2698/loose_nukes_fears.html)> [accessed 9 July 2012].

<sup>12</sup> Graham T. Allison, “The Number One Threat of Nuclear Proliferation Today: Loose Nukes From Russia,” *The Brown Journal of World Affairs*, vol. 4, no. 1, (Winter/Spring 1997): p. 66.

<sup>13</sup> Nick Paton Walsh, “Russian nuclear theft alarms US,” *The Guardian*, (18 July 2002), <<http://www.guardian.co.uk/world/2002/jul/19/chechnya.nickpatonwalsh>> [accessed 11 July 2012].

<sup>14</sup> Langewiesche, “How to Get a Nuclear Bomb, op cit., p. 2.

<sup>15</sup> “History of the Nunn-Lugar Program,” *Lugar.Senate.Gov*, (2010), <<http://lugar.senate.gov/nunnlugar/history/>> [accessed 2 August 2012].

to “[reduce] the threat posed by terrorist organizations or states of concern seeking to acquire weapons of mass destruction expertise, materials, and equipment,” according to the program’s official website.<sup>16</sup> Under CTR’s auspices, the US Departments of Defense and Energy have established numerous programs to aid Russia in securing its nuclear arsenal, the results of which have been quite impressive. In a 2011 article for the *Bulletin of the Atomic Scientists*, Kennette Benedict hailed CTR as “the most significant and successful postwar effort since the German Marshall Plan helped Europe recover from World War II.”<sup>17</sup> Wrote Benedict:

The Cooperative Threat Reduction Program has deactivated 7,527 strategic nuclear warheads and destroyed 774 intercontinental ballistic missiles, 651 submarine launched ballistic missiles, and 906 nuclear air-to-surface missiles. It has upgraded security at 24 nuclear weapons storage sites in Russia...To date, the Nunn-Lugar program has reduced nuclear arsenals in Russia from 30,000 in 1991 to about 12,000 warheads today.<sup>18</sup>

In addition to CTR, the US has partnered with the Russian government to take other steps to prevent Russian nuclear materials from falling into the wrong hands. For instance, in 1993, the US and Russia signed the “Highly Enriched Uranium Purchase Agreement,” which committed Russia to dismantling thousands of nuclear weapons and selling the weapons’ uranium to the US, for use in American nuclear power plants. Undeniably, this initiative, referred to as the “Megatons to Megawatts Program,” has been beneficial for both sides—the United States generates 10% of its electricity from Russian uranium, while estimates assert that Russia will have earned \$8 billion from the program by 2013, when it officially expires. Equally important is the fact that, by selling uranium to the United States,

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<sup>16</sup> “Office of Cooperative Threat Reduction (ISN/CTR),” (Washington, DC: State Department, 2012), <<http://www.state.gov/t/isn/58381.htm>> [accessed 16 July 2012].

<sup>17</sup> Kennette Benedict, “Nunn-Lugar: 20 years of Cooperative Threat Reduction,” *Bulletin of the Atomic Scientists*, (19 December 2011), <<http://www.thebulletin.org/web-edition/columnists/kennette-benedict/nunn-lugar-20-years-of-cooperative-threat-reduction>> [accessed 11 July 2012].

<sup>18</sup> *Ibid.*



Russia is ridding itself of nuclear materials that could potentially be stolen from its nuclear facilities.<sup>19</sup>

Despite the success stories that CTR and “Megatons to Megawatts” represent, Russia’s nuclear security remains a liability. In particular, while the Nunn-Lugar initiative has certainly been successful in reducing the size of Russia’s nuclear arsenal, concerns exist that it has failed to sufficiently upgrade security within the country’s nuclear infrastructure. The responsibility for ensuring that these upgrades are made lies with the US Department of Energy. Specifically, this task falls under the purview of the National Nuclear Security Administration (NNSA), which sends managers and technicians from the US to Russia in order to supervise local officials in their installation and implementation of security upgrades.<sup>20</sup> As William Langewiesche pointed out in a 2006 article for *The Atlantic*,<sup>21</sup> the NNSA’s work itself is not the main factor contributing to the Russian nuclear complex’s lingering security problems. Rather, this issue can be attributed to two other factors. First, the task of upgrading Russia’s nuclear security apparatus is an immense one, as evidenced by Langewiesche’s assertion, referenced in Section 1, that, “Over the years, the NNSA has identified approximately 220 buildings at fifty-two sites...that are in dire need of treatment.” Second, many NNSA officials have expressed doubts about the strength of the Russian commitment to nuclear security, and have argued that “as soon as US funding ends, [the improvements made by the NNSA] will slip into disrepair.” Of course, given the current fiscal concerns dominating American politics, the US government cannot be expected to continue pouring resources into the Russian nuclear complex indefinitely. In light of this reality, Russia’s apparently-

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<sup>19</sup> Unfortunately, “Megatons to Megawatts” expires in 2013, after which Russia will no longer be providing the US with uranium from its nuclear warheads, according to the following source:

<<http://www.marketwatch.com/story/megatons-to-megawatts-program-recycles-450-metric-tons-of-weapons-grade-uranium-into-commercial-nuclear-fuel-2012-07-09>>

<sup>20</sup> Langewiesche, “How to Get a Nuclear Bomb, op cit., p. 2.

<sup>21</sup> All information in this paragraph pertaining to continuing problems with Russia’s nuclear security apparatus is drawn from Langewiesche, “How to Get a Nuclear Bomb,” pp. 1-4, unless otherwise noted.

tenuous commitment to safeguarding its nuclear resources is troubling, to say the least.

## **Pakistan**

### ***Historical Background and Overview of Nuclear Program***<sup>22</sup>

Pakistan explicitly became a member of the nuclear weapons club in 1998, when it detonated six weapons between May 28 and May 30, in what was largely seen as a response to similar tests conducted by India earlier that month. Though Pakistan only became a NWS in 1998, the roots of its nuclear program run far deeper. Seeking to gain a military advantage over its Indian adversary, the Pakistani government established the Pakistan Atomic Energy Commission (PAEC) in 1956. However, in the ensuing fifteen years, the PAEC's nuclear efforts failed to yield any substantive results.

Real progress began to occur in the 1970s, spurred on by the twin shocks of defeat by India in the Indo-Pakistani War of 1971, along with India's detonation of its first nuclear weapon in 1974. Under the leadership of AQ Khan, a foreign-educated metallurgist who returned to Pakistan in 1975 to aid in his homeland's nuclear efforts, the PAEC was able to make substantial progress. By 1983, Pakistan had conducted a "cold test"<sup>23</sup> of a nuclear device,<sup>24</sup> and by 1984, according to Khan, the Islamic Republic possessed the capability to assemble a basic nuclear device. However, until its 1998 weapons tests, Pakistan chose to maintain a policy of strategic ambiguity regarding its nuclear program.

Since 1998, Pakistan has greatly expanded its nuclear weapons production and assembly capabilities, completing or beginning construction on three new

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<sup>22</sup> All information in this section is drawn from the following source, unless otherwise noted: "Pakistan Country Profile: Nuclear," (Washington, DC: Nuclear Threat Initiative, 2012), <<http://www.nti.org/country-profiles/pakistan/nuclear/>> [accessed 17 July 2012].

<sup>23</sup> This term refers to a "test of a nuclear bomb minus the fissionable core," according to the source listed in the following footnote.

<sup>24</sup> "Context of '1983: Pakistan Performs 'Cold Test' of Nuclear Weapon, US Learns of Test'," *History Commons*, The Center for Grassroots Oversight, <<http://www.historycommons.org/context.jsp?item=a83chinapakistan#a83chinapakistan>> [accessed 16 July 2012].

plutonium production reactors at its Khushab facility, as well as continuing to stockpile highly-enriched uranium. This fairly-rapid expansion has led some analysts to declare Pakistan as having “the world’s fastest-growing nuclear stockpile.”<sup>25</sup>

Nonetheless, in terms of current arsenal size, Pakistan remains one of the world’s smaller nuclear powers, with estimates asserting that, at present, it possesses between 90 and 110 warheads. However, this figure should be expected to grow in the coming years, as Pakistan continues to expand the size of its nuclear complex.

Even more unsettling than the expansion of Pakistan’s nuclear capabilities is its general policy of resistance to international arms-control agreements. For instance, Pakistan is not a member of the NPT, and has declared its opposition to similar treaties, such as the Comprehensive Test Ban Treaty (CTBT) and the Fissile Material Cut-Off Treaty (FMCT).<sup>26</sup> In general, Pakistan’s recalcitrance in this arena is seen as a manifestation of its rivalry with India, as nuclear weapons are a critical component of Pakistan maintaining a strategic military balance with its neighbor, especially in light of India’s conventional superiority.

### ***The Nature of the Nuclear Threat***

The threat of Pakistani nuclear materials falling into terrorist hands is a multi-pronged issue, composed of several different scenarios: (1) insiders within the Pakistani nuclear program proliferating nuclear technology, knowledge, or assets to terrorist groups; (2) a terrorist group using force to steal nuclear materials from a Pakistani facility; (3) a radical Islamist group seizing control of the Pakistani government and nuclear arsenal, either through a coup or democratic elections. This paper will proceed to analyze each of these distinct possibilities in turn.

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<sup>25</sup> Hans M. Kristensen and Robert S. Norris, "Pakistan's nuclear forces, 2011," *Bulletin of the Atomic Scientists*, vol. 67, no. 4, (1 July 2011): p. 91.

<sup>26</sup> "Pakistan and the Bomb," (Washington, DC: Stimson Center, 2011), <<http://www.stimson.org/summaries/pakistan-and-the-bomb/>> [accessed 31 July 2012].

The threat of an individual inside the Pakistani nuclear program transferring nuclear materials or know-how to a terrorist organization is a serious one, and is indeed one that Pakistan has already been forced to confront in various forms. As Rolf Mowatt-Larssen asserted in his 2009 analysis of Pakistani nuclear security, the Islamic Republic has historically had a “dismal track record” in preventing collaboration between nuclear insiders and external elements.<sup>27</sup> The infamous AQ Khan network, through which one of Pakistan’s nuclear founding fathers, with the authorization of Pakistan’s senior political and military leadership,<sup>28</sup> passed on nuclear technology to Iran, Libya, and North Korea, is a frequently-cited instance of such partnership. However, for an even more alarming example of illicit nuclear collaboration, one need only look to Ummah Tameer-e-Nau (UTN), a militant organization founded in 2000 by former PAEC director Sultan Bashiruddin Mahmood.<sup>29</sup> Mahmood was an ardent supporter of Taliban-ruled Afghanistan, going so far as to describe it as the “ideal Islamic state.”<sup>30</sup> As evidence of his admiration for Islamic radicalism, Mahmood actually met with Osama bin Laden, and later asserted that “bin Laden asked him how he could construct a bomb if [al-Qaeda] already had the material.”<sup>31</sup> Though Mahmood later claimed that he did not reveal any sensitive information to bin Laden, the fact that such a dialogue even occurred in the first place is remarkably disturbing.

Moreover, as Mowatt-Larssen pointed out in his analysis, it would be wrong to dismiss the Khan network and UTN as mere anomalies. Rather, given rising levels of extremism in Pakistan, the potential certainly exists for collaboration between nuclear insiders and terrorist groups. The following passage was quoted at length in Section 1 of this paper, but is certainly worth repeating:

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<sup>27</sup> Mowatt-Larssen, “Nuclear Security in Pakistan,” op cit., “Collaboration Scenarios.”

<sup>28</sup> Matthew Kroenig, *Exporting the Bomb: Technology Transfer and the Spread of Nuclear Weapons*, (Ithaca, NY: Cornell University Press, 2010), p. 136.

<sup>29</sup> “Mapping Militant Organizations: Ummah Tamir-e-Nau,” (Stanford, CA: Stanford University, 2012), <<http://www.stanford.edu/group/mappingmilitants/cgi-bin/groups/view/145>> [accessed 12 July 2012].

<sup>30</sup> Ibid.

<sup>31</sup> Mowatt-Larssen, “Nuclear Security in Pakistan,” op cit., “Collaboration Scenarios.”

In the Khan and UTN cases, the rogue senior officers and their cohorts in the nuclear establishment were not caught by Pakistan's security establishment. It would be foolhardy to assume that such lapses could not happen again. The Pakistani military, intelligence, and nuclear establishments are not immune to rising levels of extremism in the country. There is a lethal proximity between terrorists, extremists, and nuclear weapons insiders. Insiders have facilitated terrorist attacks. Suicide bombings have occurred at air force bases that reportedly serve as nuclear weapons storage sites. It is difficult to ignore such trends. Purely in actuarial terms, there is a strong possibility that bad apples in the nuclear establishment are willing to cooperate with outsiders for personal gain or out of sympathy for their cause.<sup>32</sup>

However, to its credit, the Pakistani government has taken steps to ensure that individuals with radical tendencies do not gain access to sensitive nuclear information or materials. In recent years, for example, it has established a Personnel Reliability Program (PRP) to screen and monitor individuals involved with sensitive components of the nuclear program.<sup>33</sup> Under the terms of the PRP, anyone involved with a sensitive task within the nuclear complex is screened and vetted by multiple government agencies; this initial screening is then followed by re-screenings every two years, or whenever the individual is transferred to another part of the program, as well as random checks at the government's discretion. By using the PRP to rigorously screen nuclear personnel, the Pakistani government hopes to keep questionable individuals such as Khan and Sultan from gaining access to sensitive nuclear assets.

Pakistan has also implemented more stringent oversight policies regarding the export of its nuclear assets, in order to prevent another instance of proliferation similar to the example of the Khan network.<sup>34</sup> Needless to say, such reforms were long overdue. Prior to 2000, Pakistan did not have any sort of central organization managing its nuclear assets, and as a result, there was no standard set of export control guidelines for the country's various nuclear organizations. Rather, each

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<sup>32</sup> Ibid.

<sup>33</sup> Information about the PRP is drawn from the following source, unless otherwise noted: Kenneth N. Luongo and Gen. (Ret.) Naeem Salik, "Building Confidence in Pakistan's Nuclear Security," *Arms Control Today*, (December 2007): p. 14.

<sup>34</sup> Information about export controls in the following two paragraphs is drawn from Luongo and Salik, "Building Confidence in Pakistan's Nuclear Security," p. 15, unless otherwise noted.

organization acted independently in this realm, following different policies and regulations.

However, in 2000, the Pakistani government created the Strategic Plans Division (SPD), a body responsible for managing the safety and security of Pakistan's nuclear assets. The SPD, in turn, issued a set of regulations requiring all nuclear organizations to "follow established procedures for all exports, including seeking clearance from the SPD and the Ministry of Foreign Affairs." In addition, in the aftermath of the Khan scandal in 2004, the Pakistani government passed the "Export Control on Goods, Technologies, Material, and Equipment related to Nuclear and Biological Weapons and their Delivery Systems Act," which further consolidated regulations on nuclear export and created the Strategic Export Control Division (SECDIV). SECDIV is the body tasked with implementing the Export Control Act and exercising general oversight over nuclear exports, and is composed of personnel from a variety of government agencies, including the Ministries of Foreign Affairs, Commerce, and Defense; the PAEC; and the SPD.

The possibility also exists that terrorist groups could exploit vulnerabilities in the physical security of the Pakistani nuclear complex and steal weapons or materials from nuclear facilities. As mentioned earlier, since 1998, Pakistan has greatly expanded its nuclear capabilities, building new weapons, new reactors, and new facilities. This expansion of the Pakistani nuclear program places an added stress on the country's nuclear security apparatus, and as Mowatt-Larsen asserts, "increases the odds of a security breach leading to the loss of a bomb or the theft of materials to make a bomb."<sup>35</sup> The fact that several key Pakistani nuclear facilities, such as the Khushab reactors, are located in areas of heavy government-terrorist conflict makes this threat even more prominent.<sup>36</sup>

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<sup>35</sup> Mowatt-Larsen, "Nuclear Security in Pakistan," op cit., "Daunting Security Task."

<sup>36</sup> Simon Tisdall, "Pakistan nuclear projects raise US fears," *The Guardian*, (3 May 2009), <<http://www.guardian.co.uk/world/2009/may/03/pakistan-nuclear-security>> [accessed 12 July 2012].

Moreover, the threat of nuclear insiders exchanging sensitive information with outside groups has created conditions within the Pakistani nuclear complex that may actually make it easier for a terrorist group to steal assets by force. Pakistani officials recognize that, despite their best efforts to prevent it, illicit nuclear collaboration remains a possibility. As a result, they have constructed a nuclear security apparatus that is based largely on secrecy, rather than traditional forms of physical security.<sup>37</sup> Whereas the US model of nuclear security relies heavily on “redundant layers of high walls, gates, and guards” to deter terrorists from attempting nuclear theft, Pakistan shrouds its nuclear complex in clandestinity and seeks to “systemically [deny] outsiders opportunities to gain illicit access to nuclear weapons.”

The Pakistani government has adopted a variety of measures to create this air of secrecy. First, different components of the nuclear complex are separated geographically. Therefore, material processing is kept separate from material storage sites; warheads are kept separate from missiles, and so on. Second, the exact locations of nuclear storage sites are kept strictly secret, even within the nuclear complex, so as to minimize the number of people with access to this sensitive information. Finally, nuclear assets are transported discreetly, instead of in massive, armed convoys that would loudly announce their presence to potential attackers.

Pakistan’s choice to rely more on secrecy than traditional security is somewhat understandable, given the country’s unique predicament. However, while this policy succeeds in making it harder for outsiders to gather intelligence about the specifics of Pakistan’s nuclear program, it also increases the chances of a terrorist operation against the program actually succeeding, provided that the group could gain accurate information from an inside source. Take the issue of transportation, for instance. As mentioned above, Pakistan largely eschews the use of large, armed convoys to transport nuclear assets, opting instead for transports

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<sup>37</sup> The following discussion of secrecy’s role in Pakistani nuclear security is drawn from Mowatt-Larsen, “Nuclear Security in Pakistan,” sect. “Relying on Secrecy,” unless otherwise noted.

that can more easily travel “under the radar.” However, if a terrorist group somehow acquired accurate information about Pakistani nuclear transport routes, it would have a far easier time launching a successful assault against a discreet transport force than it would against a more obvious, but presumably better-armed, convoy. Thus, secrecy’s role in protecting the Pakistani nuclear complex may ultimately end up making the entire system more vulnerable to terrorist attack.

In fairness, however, the Pakistani government has undertaken efforts to strengthen the physical security of its nuclear complex, particularly with regards to its key facilities.<sup>38</sup> The SPD has been a major initiator of this push, as it has sought to implement a “multi-layered approach” to perimeter security at Pakistani nuclear facilities. This approach is based on providing three layers of security: inner perimeter (specially-trained nuclear security forces and, in some cases, air defense); outer perimeter (improved fencing, barricades, and electronic sensors), and third tier (counter-intelligence to identify potential threats from the outside). In addition, government officials have attempted to address potential vulnerabilities in Pakistan’s nuclear transport system by acquiring specialized vehicles that would provide added protection against terrorist assault.

Finally, there is the possibility of a radical Islamist group seizing political control of Pakistan through an election or coup, and subsequently gaining control of the country’s nuclear arsenal. Fortunately, the prospect of an electoral takeover by radical Islamists seems rather dim, as radical Islamist parties have never earned more than 11% of the Pakistani popular vote.<sup>39</sup> More troubling is the possibility of radical elements within the Pakistani military launching a coup against the country’s civilian government and seizing control of the nuclear complex.

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<sup>38</sup> This discussion of physical security upgrades draws from Luongo and Salik, “Building Confidence,” p. 14, unless otherwise noted.

<sup>39</sup> Luongo and Salik, “Building Confidence,” op cit., p. 12.



The growing radicalization of the Pakistani military is a very real, but not particularly recent, development. In a 2000 article for *The World Today*, Mohan Malik warned:

...the [Pakistani] military is no longer a unified institution. Since the mid-1980s, well-organized groups of Islamic zealots have penetrated its core middle and lower ranks, and it is now split into pro- and anti-Western factions. Those elements that want to use Islam and nuclear weapons for a politically aggressive role, and as bargaining chips, are gaining influence.<sup>40</sup>

Unfortunately, in the years since Malik's bleak assessment, this trend of radicalization has not been reversed, as evidenced by Fareed Zakaria's 2011 declaration that, "...the evidence is now overwhelming that [the Pakistani military] has been infiltrated at all levels by violent Islamists, including Taliban and al-Qaeda sympathizers."<sup>41</sup> Given the Pakistani military's historical propensity for overthrowing civilian governments, such a reality is a definite cause for concern.<sup>42</sup>

However, one must be careful of exaggerating the nuclear threat posed by radical Islamists within the Pakistani military. In the event of a coup, there would be no guarantee that the radicals would even be able to wrest control of the nuclear arsenal from existing military authorities. The ultimate authority on Pakistan's nuclear forces is the National Command Authority (NCA), a "political-military" body that is responsible for the weapons' deployment and use, and is strongly under the sway of the military.<sup>43</sup> An Islamist coup would likely divide loyalties within the Pakistani armed forces, and so a successful seizure of the nuclear arsenal by radical military elements would be far from a foregone conclusion, especially if the NCA resisted.

### ***US Involvement***

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<sup>40</sup> Mohan Malik, "Front Line, Fault Line," *The World Today*, (February 2000), p. 16.

<sup>41</sup> Fareed Zakaria, "The radicalization of Pakistan's military," *The Washington Post*, (22 June 2011), <[http://www.washingtonpost.com/opinions/the-radicalization-of-pakistans-military/2011/06/22/AGbCBSgH\\_story.html](http://www.washingtonpost.com/opinions/the-radicalization-of-pakistans-military/2011/06/22/AGbCBSgH_story.html)> [accessed 23 July 2012].

<sup>42</sup> The Pakistani military has successfully seized control of the government on three separate occasions: 1958, 1977, and 1999.

<sup>43</sup> Mowatt-Larssen, "Nuclear Security in Pakistan," op cit., "Rising Risks."

As with Russia, the United States has recognized the national security threat posed by Pakistan's nuclear security struggles, and has provided Islamabad with assistance in securing its nuclear assets. Bilateral talks between the two countries regarding nuclear security began in October 2001, after the 9/11 attacks intensified US concerns about the threat of "loose nukes."<sup>44</sup> Soon afterwards, the US launched a highly-classified \$100 million aid program directed to Pakistan, hoping to improve the security of the Islamic Republic's nuclear arsenal.<sup>45</sup> Under the terms of this program, the United States provided Pakistan with, among other things: modern security technologies, including surveillance systems, helicopters, and night vision goggles; a template for its Personnel Reliability Program; and funding for the construction of a "nuclear security training center."<sup>46</sup> However, according to a 2009 report by *The New York Times*, the aid program has largely "petered out," mainly due to the Pakistani government's lack of transparency.<sup>47</sup> According to the *Times* report, "American officials have never been permitted to see how much of the [aid] money was spent, the facilities where the weapons are kept, or even a tally of how many Pakistan has produced."<sup>48</sup> In addition, construction of the nuclear security training center that the US provided funding for is reportedly "running years behind schedule."<sup>49</sup>

In comparison to the US-Russia nuclear relationship, the US-Pakistan relationship is clearly far less transparent. Much of this has to do with the Pakistani's government general suspicion of the US. As Andrew Grotto and Michelle

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<sup>44</sup> Luongo and Salik, "Building Confidence," op cit., p. 16.

<sup>45</sup> David E. Sanger and William J. Broad, "US Secretly Aids Pakistan in Guarding Nuclear Arms, *The New York Times*, (18 November 2007), <[http://www.nytimes.com/2007/11/18/washington/18nuke.html?\\_r=1](http://www.nytimes.com/2007/11/18/washington/18nuke.html?_r=1)> [accessed 23 July 2012].

<sup>46</sup> Andrew J. Grotto and Michelle Hammer, "Nuclear Security Cooperation Between the United States and Pakistan: A Survey from 2000-2009," *The Center for American Progress*, (24 June 2009), <[http://www.americanprogress.org/issues/2009/06/pakistan\\_nuclear\\_survey.html](http://www.americanprogress.org/issues/2009/06/pakistan_nuclear_survey.html)> [accessed 23 July 2012].

<sup>47</sup> David E. Sanger, "Pakistan Strife Raises US Doubt on Nuclear Arms, *The New York Times*, (3 May 2009), <[http://www.nytimes.com/2009/05/04/world/asia/04nuke.html?\\_r=2](http://www.nytimes.com/2009/05/04/world/asia/04nuke.html?_r=2)> [accessed 23 July 2012].

<sup>48</sup> Ibid.

<sup>49</sup> Ibid.

Hammer pointed out in a 2009 analysis for the Center for American Progress, there is a persistent concern within the Pakistani government that “American offers of assistance mask more nefarious motives of espionage or even seizing Pakistan’s arsenal.”<sup>50</sup> Because of this fear, Pakistan has kept a great deal of information about its nuclear program secret, making it difficult for the US to determine the effectiveness of its \$100 million aid program and gauge the true level of security within Pakistan’s nuclear complex.

### **North Korea**

#### ***Historical Background and Overview of Nuclear Program***<sup>51</sup>

North Korea tested its first nuclear weapon in 2006, detonating a plutonium device in North Hamgyeong Province, near the Chinese border. The successful test came as a triumph for the North Korean nuclear program, which began in earnest in 1956, when North Korea joined the Soviet Union’s Joint Institute for Nuclear Research. Though it received some early assistance from the Soviet Union and China, North Korea ultimately spent the majority of the next fifty years developing nuclear weapons indigenously, without a great deal of foreign assistance.

Given the notoriously secretive nature of the North Korean regime, reliable intelligence regarding the specifics of the country’s nuclear program is difficult to come by. The Federation of American Scientists estimates that the regime’s stockpile consists of fewer than ten warheads, and notes that there is “no publicly available evidence that North Korea has operationalized its nuclear weapons capability.”<sup>52</sup>

For most of its recent history, North Korea has had a decidedly antagonistic relationship with the international nuclear nonproliferation regime. However, prior to the mid-1990s, North Korea actually seemed to be on the path to becoming a

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<sup>50</sup> Grotto and Hammer, “Nuclear Security Cooperation Between the United States and Pakistan,” op cit.

<sup>51</sup> All information in this section is drawn from the following source, unless otherwise noted: “North Korea Country Profile: Nuclear,” (Washington, DC: Nuclear Threat Initiative, 2012), <<http://www.nti.org/country-profiles/north-korea/nuclear/>>, [accessed 7 July 2012].

<sup>52</sup> “Status of World Nuclear Forces,” op cit.

responsible member of this framework. It signed on to the NPT in 1985, and in 1992, signed the “Joint Declaration on the Denuclearization of the Korean Peninsula” with South Korea, pledging to “not test, manufacture, produce, receive, possess, store, deploy, or use nuclear weapons.” Trouble began to brew in 1993, when inspectors from the International Atomic Energy Agency (IAEA), the international community’s nuclear watchdog, were denied access to two North Korean nuclear waste sites. The IAEA responded by asking the United Nations Security Council for permission to conduct additional inspections, which prompted North Korea to submit its resignation from the NPT. Eventually, the US was able to convince the Kim regime to withdraw its resignation, and further collaborated with the regime to forge an “Agreed Framework” in 1994, under which North Korea agreed to freeze activity at its plutonium facilities and work to implement the terms of the 1992 Joint Declaration, in exchange for US assistance in reactor construction. However, the Agreed Framework would ultimately collapse in the early years of the second Bush administration, amidst US concerns that North Korea was embarking on a secret uranium-enrichment program. The US imposed economic sanctions late in 2002, prompting North Korea to resume nuclear activity, expel IAEA inspectors, and withdraw from the NPT. Since then, North Korea has been engaged in on-and-off multilateral discussions regarding its nuclear program (the so-called Six Party Talks, including the US, Russia, China, Japan, North Korea, and South Korea), though no lasting agreement has come of these negotiations.

### ***The Nature of the Nuclear Threat***

The threat of North Korean nuclear weapons falling into terrorist hands manifests itself primarily in the possibility that North Korea could, directly or indirectly, give nuclear weapons or materials to terrorist groups. Several of North Korea’s past actions demonstrate its general disregard for international nonproliferation norms. For instance, a 2010 UN report asserted that the regime was using a variety of illicit means to export nuclear technology to Iran and Syria,

thus circumventing the UN sanctions that had been levied against it.<sup>53</sup> In addition, North Korea was an active participant in AQ Khan's nuclear proliferation network,<sup>54</sup> and allegedly paid more than \$3 million to senior members of the Pakistani military for access to nuclear knowledge and equipment.<sup>55</sup> Such examples paint a picture of a regime not beholden to traditional norms that restrain governments from acts of nuclear proliferation.

Moreover, North Korea's diplomatic isolation on the world stage, coupled with the bleak state of its economy, puts the regime in a situation in which it may feel that it has nothing to lose by spreading nuclear materials, technology, and know-how to other states, or even a terrorist group. As one expert told the Council on Foreign Relations, in a 2010 interview also referenced in Section 1, "North Korea would sell just about anything to anyone."<sup>56</sup> Though that expert was also quick to assert that no evidence has yet been presented that indicates that North Korea has sold nuclear assets to non-state actors, the regime's past actions do not exactly assuage fears that such an event lies within the realm of possibility.

A secondary concern with regards to the North Korea nuclear program is the possibility that a collapse of the country's authoritarian regime could lead to a loss of control over its nuclear arsenal. This issue has taken on an added relevance in the past year, as the death of Kim Jong-il has raised concerns over whether the Supreme Leader's young successor, Kim Jong-un, is capable of maintaining the Kim family's grip on political power. If the Kim regime were to collapse, its nuclear assets could potentially "fall into the hands of warlords or factions," and these elements might

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<sup>53</sup> "UN report: Iran, Syria receiving North Korea nuclear technology," *Haaretz*, (28 May 2010), <<http://www.haaretz.com/news/diplomacy-defense/un-report-iran-syria-receiving-north-korea-nuclear-technology-1.292758>> [accessed 8 July 2012].

<sup>54</sup> "AQ Khan's Network," GlobalSecurity.org, <<http://www.globalsecurity.org/wmd/world/dprk/khan-dprk.htm>> [accessed 9 July 2012].

<sup>55</sup> R. Jeffrey Smith, "Pakistan's nuclear-bomb maker says North Korea paid bribes for know-how," *The Washington Post*, (6 July 2011), <[http://www.washingtonpost.com/world/national-security/pakistans-nuclear-bomb-maker-says-north-korea-paid-bribes-for-know-how/2010/11/12/gIQAZ1kH1H\\_story.html](http://www.washingtonpost.com/world/national-security/pakistans-nuclear-bomb-maker-says-north-korea-paid-bribes-for-know-how/2010/11/12/gIQAZ1kH1H_story.html)> [accessed 23 July 2012].

<sup>56</sup> Jeffrey Lewis, interview by Jayshree Bajoria, op cit.

very well be even less beholden to international proliferation norms than the current regime.<sup>57</sup> Moreover, even if the US were to intervene and attempt to unilaterally secure North Korea's arsenal, the task would undoubtedly be complicated by the reality that few outside the inner circles of the regime's nuclear program have any idea of precisely how large the arsenal is, or where it is located.<sup>58</sup>

### ***US Involvement***

The US effort to prevent North Korean nuclear assets from falling into terrorist hands consists of two primary components: (1) diplomatic efforts aimed at convincing the Kim regime to dismantle its nuclear program and return to the NPT; and (2) interdiction efforts designed to prevent North Korea from proliferating its nuclear assets and know-how to outside sources. Regarding the first point: unlike Russia and Pakistan, which the US accepts (somewhat begrudgingly, in Pakistan's case) as members of the nuclear weapons club, a nuclear North Korea has been described by US officials as an "intolerable" and "unacceptable" reality.<sup>59</sup> As mentioned earlier, the US has been engaged in discussions with North Korea regarding its nuclear program since the 1990s, and, throughout this time period, it has vehemently opposed the idea of a nuclear-armed Kim regime, insisting that the end result of any agreement must be a nuclear weapons-free North Korea that is part of the NPT and subject to IAEA oversight. Though the specifics of its negotiating strategy have varied, the US has generally offered North Korea a combination of "carrots" (energy assistance, assurances of peace), balanced by the threat of

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<sup>57</sup> Ashton B. Carter, Co-Director, Preventive Defense Project, Kennedy School of Government, Harvard University, "Testimony," (before the US Senate Committee on Foreign Relations; Washington, DC: US Senate, 6 March 2003), p. 2.

<sup>58</sup> Michael E. O'Hanlon, "North Korea Collapse Scenarios," *Brookings Northeast Asia Commentary*, no. 6 of 25, (June 2009), <<http://www.brookings.edu/research/opinions/2009/06/north-korea-ohanlon>> [accessed 9 July 2012].

<sup>59</sup> Emma Chanlett-Avery and Sharon Squassoni, "North Korea's Nuclear Test: Motivations, Implications, and US Options," (Report prepared for US Congress; Washington, DC: Congressional Research Service, 24 October 2006), p. 13.

“sticks” (economic sanctions), in order to bring about North Korea’s nuclear disarmament.<sup>60</sup>

In addition to its diplomatic efforts, the US has also sought to prevent North Korean nuclear exports from reaching their intended destinations by employing a strategy of naval interdiction. This strategy is employed under the umbrella of the Proliferation Security Initiative (PSI), a global cooperative effort, launched in 2003 and involving more than 90 countries, that “aims to stop trafficking of weapons of mass destruction, their delivery systems, and related materials to and from states and non-state actors of proliferation concern.”<sup>61</sup> Though the US and its allies have yet to interdict any North Korean ships carrying nuclear materials, several North Korean vessels carrying missile technologies and conventional weaponry have been successfully turned back by PSI participants,<sup>62</sup> <sup>63</sup> bolstering hopes that these interdiction efforts will help to deter North Korea from attempting to proliferate nuclear materials to other states and non-state actors.

### **Other States**

While a combination of academic literature and historical evidence supports the assertion that Russia, Pakistan, and North Korea represent the most likely sources of a terrorist-controlled nuclear weapon, they are certainly not the only possible sources. After all, the nuclear weapons club contains six other members, and at least one additional state could very well join the group within the next decade. Therefore, it is important that this paper briefly addresses nuclear security with regards to these other states.

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<sup>60</sup> “North Korea Country Profile,” op cit.

<sup>61</sup> “Proliferation Security Initiative,” US Department of State, <<http://www.state.gov/t/isn/c10390.htm>> [accessed 9 July 2012].

<sup>62</sup> David E. Sanger, “US Said to Turn Back North Korea Missile Shipment,” *The New York Times*, (12 June 2011), < <http://www.nytimes.com/2011/06/13/world/asia/13missile.html>> [accessed 10 July 2012].

<sup>63</sup> Neil MacFarquhar, “North Korean Military Parts Were Intercepted, UN Says,” *The New York Times*, (26 February 2010), <<http://www.nytimes.com/2010/02/26/world/asia/26nations.html>> [accessed 10 July 2012].

Over the past sixty years, the US nuclear complex has proven itself to be “safe and secure.”<sup>64</sup> A variety of technological innovations<sup>65</sup> makes the theft and unauthorized detonation of an American nuclear weapon by an outside agent an extremely difficult proposition. While no security apparatus is perfect, the US has certainly amassed a commendable track record in keeping its nuclear devices and materials out of terrorist hands.

Similarly, the nuclear complexes of the UK and France have proven to be quite secure, having been incident-free since the two countries’ respective ascensions to NWS status in 1952 and 1960. In addition, the two countries signed an agreement in 2010 to enhance bilateral cooperation in nuclear security research and implementation,<sup>66</sup> a reassuring development that should improve nuclear security in both countries. In the UK, there have been some concerns raised, particularly by the Ministry of Defence, that decreased budgets may adversely affect the military’s ability to protect the country’s nuclear weapons.<sup>67</sup> Thus far, however, these spending cuts have not resulted in the UK’s nuclear security being compromised.

China seems unlikely to serve as the source of a terrorist-controlled nuclear weapon. Though Beijing did provide Pakistan with a range of nuclear assistance, including “enough [highly-enriched uranium] for two nuclear weapons,” in the 1980s, the Chinese government has since become a much more responsible member of the nuclear weapons club.<sup>68</sup> For example, Beijing joined the IAEA and NPT in

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<sup>64</sup> Grant Elliot, “US Nuclear Weapon Safety and Control,” *MIT Program in Science Technology, and Society*, (12 December 2005), <<http://web.mit.edu/gelliott/Public/sts.072/paper.pdf>> [accessed 2 August 2012], p.9.

<sup>65</sup> These innovations include such mechanisms as Environment Detection Sensors, Permissive Action Links, Enhanced Nuclear Detonation Safety, Insensitive High Explosive, and Fire Resistant Pits, all of which are detailed, in-depth, in Elliott’s report.

<sup>66</sup> “France Country Profile: Nuclear,” (Washington, DC: Nuclear Threat Initiative, 2012), <<http://www.nti.org/country-profiles/france/nuclear/>>, [accessed 2 August 2012].

<sup>67</sup> Rob Edwards, “Nuclear weapon safety hindered by cuts, says MoD report,” *The Guardian*, (17 July 2012), <<http://www.guardian.co.uk/uk/2012/jul/17/nuclear-weapons-safety-cuts-mod>> [accessed 2 August 2012].

<sup>68</sup> Kroenig, *Exporting the Bomb*, op cit., p. 112.



1984 and 1992, respectively; has imposed a tougher regime of export controls on nuclear technologies; and “has agreed to refrain from exporting nuclear materials and technology to nonnuclear weapon states unless the materials and technologies are placed under IAEA safeguards.”<sup>69</sup> In addition, recognizing the threat posed by nuclear theft, the Communist regime keeps the majority of its nuclear assets in an underground storage depot in Shanxi Province.<sup>70</sup> This central depot, referred to as the “22 Base,” is protected by a spectrum of physical security measures, including “real time video monitoring, [an] infrared security system, a computerized warhead accounting system...fingerprint and other access control, and advanced communications linking sites within the complex.”<sup>71</sup> Though the vulnerability of nuclear assets during transportation outside of the complex is a potential cause for concern,<sup>72</sup> Beijing’s demonstrated commitment to nuclear security makes it an unlikely candidate to facilitate an act of nuclear terrorism.

Assessing the security of India’s nuclear weapons complex is somewhat problematic, as India remains a non-signatory to the NPT. Although India does subject select civilian nuclear facilities to IAEA oversight, this access is not comprehensive, raising questions of transparency.<sup>73</sup> Even in the domestic setting, there is an unsettling lack of disclosure with regards to how India’s military-focused nuclear facilities are managed, as information about the operation of these sites is withheld from the public under the country’s “Official Secrets Act.”<sup>74</sup> Thus, while

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<sup>69</sup> Ibid., p. 117.

<sup>70</sup> Mark A. Stokes, “China’s Nuclear Warhead Storage and Handling System,” Project 2049 Institute, (12 March 2010), <[http://project2049.net/documents/chinas\\_nuclear\\_warhead\\_storage\\_and\\_handling\\_system.pdf](http://project2049.net/documents/chinas_nuclear_warhead_storage_and_handling_system.pdf)> [accessed 2 August 2012], p.5.

<sup>71</sup> Ibid., pp. 6-7.

<sup>72</sup> Ibid., p. 11.

<sup>73</sup> “India Country Profile: Nuclear,” (Washington, DC: Nuclear Threat Initiative, 2012), <<http://www.nti.org/country-profiles/india/nuclear/>>, [accessed 3 August 2012].

<sup>74</sup> Dr. A. Gopalakrishnan, “Are Indian nuclear weapons facilities safe?” *Rediff News*, (12 April 2011), <<http://www.rediff.com/news/column/are-indian-nuclear-weapons-facilities-safe/20110412.htm>> [accessed 3 August 2012].

India has managed to survive almost four decades without a serious breach of nuclear security, its lack of transparency is a potential cause for a concern.

Israel's nuclear program is shrouded in an even more pronounced cloud of secrecy. Israel has never conducted a publicly-disclosed nuclear weapons test, and maintains a firm policy of "nuclear ambiguity," even going so far as to "[prohibit] publication of any factual Israeli-based information" about its nuclear weapons program.<sup>75</sup> In addition, it is a non-signatory to the NPT, and thus is not subject to any sort of international oversight of its nuclear security apparatus. Because of this high degree of opacity, it is difficult to gauge exactly how secure Israel's arsenal actually is.

Iran has not yet developed nuclear weapons, and has publicly declared that it has no intention of doing so, maintaining that its nuclear program is focused solely on civilian needs. Because Iran is not a nuclear weapons state, to evaluate Tehran's nuclear security apparatus would require a level of speculation that lies outside the scope of this paper. However, preventing Iran from acquiring such capabilities will play a critical role in precluding the proliferation of nuclear assets to terrorist groups, as will be discussed in Section 4.

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<sup>75</sup> "Israel Country Profile: Nuclear," (Washington, DC: Nuclear Threat Initiative, 2012), <<http://www.nti.org/country-profiles/israel/nuclear/>> [accessed 3 August 2012].

### **Section 3: Evaluating the Current Nuclear Nonproliferation Regime**

As Section 2 of this paper illustrated, the threat of nuclear assets from a nuclear weapons state falling into terrorist hands is a far more serious threat than commonly perceived, and is one with potentially grave global consequences. This begs the question: what measures has the international community implemented to prevent such unauthorized proliferation from happening?

Even a cursory glance at the world of nuclear nonproliferation reveals a multitude of treaties and regimes in place to prevent the unauthorized spread of nuclear assets. With countless measures having been implemented at the unilateral, bilateral, regional, and global levels, a comprehensive analysis would stretch this paper to interminable lengths, and detract from its core focus.<sup>76</sup> Therefore, this paper will limit its analysis to two of the international nonproliferation framework's most important institutions, along with two treaties with particular relevance to the issues of nuclear terrorism and nuclear security.

#### **The NPT**

At present, the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) stands as a core part of the international nonproliferation regime. Broadly, the treaty, which entered into force in 1970, aims to prevent the spread of nuclear weapons beyond five recognized nuclear weapons states (the US, Russia, China, UK, and France). In 2004, Thomas Graham, Jr. aptly described the NPT as being based, in part, on a fundamental tradeoff between nuclear weapons states (NWS) and non-nuclear weapons states (NNWS). To use the words of Graham, Jr.:

The NPT is based on a central bargain: the NPT non-nuclear-weapon states agree never to acquire nuclear weapons and the NPT nuclear-weapon states in exchange

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<sup>76</sup> For those interested in learning more about the range of components that make up the international nonproliferation regime, the Nuclear Threat Initiative has an excellent database with in-depth looks at individual treaties and regimes, available at the following link: <<http://www.nti.org/treaties-and-regimes/treaties/>>.

agree to share the benefits of peaceful nuclear technology and to pursue nuclear disarmament aimed at the ultimate elimination of their nuclear arsenals.<sup>77</sup>

Without question, the NPT has had a positive impact on the cause of nuclear nonproliferation. With all but four countries party to the treaty (India, Pakistan, and Israel are non-signatories, and North Korea withdrew in 2003), the NPT “has the widest adherence of any arms control agreement” currently in effect.<sup>78</sup> Because of its wide acceptance within the international community, the treaty has played an integral role in advancing nuclear nonproliferation as a global norm, and as an ethic that responsible members of international society are expected to subscribe to.<sup>79</sup>

Additionally, within the context of preventing nuclear materials from falling into terrorist hands, the NPT’s positive impact is twofold.<sup>80</sup> First, by limiting the possession of nuclear weapons (ideally) to a core group of five states, the NPT helps to keep nuclear weapons from being developed in countries that are unable to adequately protect them. Second, the NPT implements controls on the transfer of nuclear materials and requires all nuclear states to submit to IAEA standards regarding “accounting and control” systems, thus making nuclear materials less susceptible to theft or unauthorized export.

Despite these positive effects, the NPT has also proven to be a flawed institution in several key ways. First, the treaty has long struggled with the issue of noncompliance. As analysts at the Nuclear Threat Initiative have pointed out, “the NPT does not have a built-in mechanism for non-compliance.”<sup>81</sup> Instead, when a state is found to be in violation of the terms of the NPT, the International Atomic

<sup>77</sup> Thomas Graham, Jr., “Avoiding the Tipping Point,” *The Arms Control Association*, (November 2004), <[http://www.armscontrol.org/act/2004\\_11/BookReview](http://www.armscontrol.org/act/2004_11/BookReview)> [accessed 8 July 2012].

<sup>78</sup> “The Nuclear Nonproliferation Treaty (NPT) at a Glance,” *The Arms Control Association*, (April 2005), <<http://www.armscontrol.org/factsheets/nptfact>> [accessed 8 July 2012].

<sup>79</sup> Leonard Weiss, “The Nuclear Nonproliferation Treaty: Strengths and Gaps,” in *Fighting Proliferation: New Concerns for the Nineties*, edited by Henry Sokolski, (Maxwell Air Force Base, AL: Air University Press, 1996): available online at: <<http://www.fas.org/irp/threat/fp/b19ch2.htm>>

<sup>80</sup> Analysis of this impact is drawn from the following source, unless otherwise noted:

Joseph F. Pilat, “The end of the NPT regime?,” *International Affairs*, vol. 83, no. 3, (2007): pp. 480-481

<sup>81</sup> “Treaty on the Non-Proliferation of Nuclear Weapons (NPT),” (Washington, DC: Nuclear Threat Initiative, 2012), <<http://www.nti.org/treaties-and-regimes/treaty-on-the-non-proliferation-of-nuclear-weapons/>> [accessed 23 July 2012].

Energy Agency (the IAEA, which, as will be detailed later in this section, is responsible for actually carrying out compliance inspections) simply reports the violating state to the UN, which has the responsibility of actually determining a punishment. This method stands in stark contrast to other nuclear treaties, such as the proposed Comprehensive Test Ban Treaty (CTBT), which would “[provide] for measures to redress a violation of the Treaty and to ensure compliance, including sanctions, and for settlement of disputes.”<sup>82</sup> Because the NPT does not contain a standardized framework for dealing with violators, it has faced difficulties in dissuading noncompliance, and in building consensus among signatories regarding how to enforce compliance.<sup>83</sup>

Second, the NPT contains a clause (Article X) that allows a state to withdraw from the Treaty “if it decides that extraordinary events, related to the subject matter of [the treaty], have jeopardized [its] supreme interests...”<sup>84</sup> To date, this clause has only been fully exercised once, when North Korea withdrew from the treaty in 2003, asserting that the US government’s “vicious hostile policy” towards the Kim regime constituted a serious threat to North Korean sovereignty and security.<sup>85</sup> This example serves as a disturbing illustration of the loophole that Article X represents. As Graham Allison noted in a 2008 essay, what North Korea essentially did was receive nuclear technologies under the terms of the NPT, withdraw from the NPT, and then use those same technologies to produce plutonium for its nuclear weapons.<sup>86</sup> Unfortunately, Article X makes this kind of exploitation of the NPT’s

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<sup>82</sup> “Comprehensive Nuclear-Test-Ban Treaty (CTBT),” (Washington, DC: Nuclear Threat Initiative, 2012), <<http://www.nti.org/treaties-and-regimes/comprehensive-nuclear-test-ban-treaty-ctbt/>> [accessed 23 July 2012].

<sup>83</sup> Pilat, “The End of the NPT Regime?,” op cit., p. 473.

<sup>84</sup> “The Treaty on the Non-Proliferation of Nuclear Weapons (NPT),” *Inventory of International Nonproliferation Organizations and Regimes*, Center for Nonproliferation Studies, <[http://www.nti.org/media/pdfs/aptnpt.pdf?\\_=1316547167&\\_=1316547167](http://www.nti.org/media/pdfs/aptnpt.pdf?_=1316547167&_=1316547167)>, pp. 3-4.

<sup>85</sup> “North Korean statement on withdrawal from nuclear pact,” *The Guardian*, (10 January 2003), <<http://www.guardian.co.uk/world/2003/jan/10/northkorea2>> [7 August 2012].

<sup>86</sup> Graham Allison, “Nuclear Deterrence in the Age of Nuclear Terrorism,” *Technology Review*, (November/December 2008), p. 71.

terms very possible, and there is no reason to believe that it will not happen again at some point in the future.

Finally, the international community is currently locked in an “increasingly bitter” debate over Article VI of the NPT,<sup>87</sup> a dispute which threatens to undermine the legitimacy of the entire institution. Article VI declares that:

Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control.<sup>88</sup>

This portion of the NPT is a critical component of the treaty’s central trade-off between NWS and NNWS. Essentially, NNWS must acquiesce to a world in which only a select few states have nuclear weapons, but in return, they receive the assurance that the NWS will gradually reduce their arsenals, until the world is one day free of nuclear weapons.

Unfortunately, the NWS have failed to truly hold up their end of the bargain. Technically, the NWS have pursued some forms of negotiations, and thus cannot be deemed legally noncompliant with Article VI. In fact, there has even been some modest progress on the issue of nuclear disarmament, particularly between the US and Russia. During the Cold War, the two countries had peak nuclear stockpiles of 33,000 and 45,000 warheads, respectively.<sup>89</sup> Through a combination of bilateral agreements and unilateral reductions, these arsenal sizes have been reduced to 8,500 warheads for Russia, and 7,700 for the US.<sup>90</sup> Furthermore, the recent passage of the New START treaty in 2011 means that each country will only be allowed to deploy 1,550 warheads, with the rest remaining in reserve or awaiting eventual dismantlement.

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<sup>87</sup> Joseph F. Pilat, "The Future of the Nuclear Non-proliferation Treaty (NPT) Regime," Los Alamos National Laboratory, (2007), <[http://www.lanl.gov/orgs/nso/docs/fy07/LA-UR-071574\\_The\\_Future\\_of\\_the\\_NPT\\_Regime.pdf](http://www.lanl.gov/orgs/nso/docs/fy07/LA-UR-071574_The_Future_of_the_NPT_Regime.pdf)> [accessed 23 July 2012]

<sup>88</sup> "The Treaty on the Non-Proliferation of Nuclear Weapons (NPT)," *op cit.*, p. 3.

<sup>89</sup> Garwin, "Nuclear Weapons in the 21<sup>st</sup> Century: Prospects and Policy," *op cit.*

<sup>90</sup> "Status of World Nuclear Forces," *op cit.*

While this progress by the US and Russia is certainly a welcome development, it fails to obscure the broader trends indicating that Article VI has failed to induce any sort of substantive disarmament from the majority of the nuclear weapons club's members. There are still roughly 17,300 total warheads around the world,<sup>91</sup> and, the US and Russia aside, most NWS have given little indication that they intend to reduce the size of their arsenals at any point in the near future. In a 2011 article for the Nuclear Age Peace Foundation, David Krieger summarized general disarmament trends as such:

...modest reductions by the US and Russia, indicating a continuing commitment to maintaining their nuclear arsenals at a relatively high level of overkill; no reductions by the UK, France, China and Israel, indicating a continuing commitment to retaining their arsenals at current levels...and increases in the arsenals of India and Pakistan, indicating a continuing nuclear arms race in South Asia.<sup>92</sup>

It is also important to note that, while the US and Russia have greatly reduced the size of their arsenals, both countries have also undertaken concurrent efforts to modernize their existing nuclear weapons complexes. Russia continues to modernize its warheads and delivery systems as part of the "comprehensive rearmament" of its military launched by Dmitri Medvedev in 2009,<sup>93</sup> while the US is currently in the process of modernizing its warheads, delivery systems, and nuclear production complex.<sup>94</sup> Thus, while US and Russian arsenal reductions are somewhat heartening for nuclear disarmament advocates, this optimism must be tempered by the reality that both countries are seeking to make their remaining weapons more effective and longer-lasting.

Moreover, treaties that would help to advance the stated intentions of Article VI, such as CTBT and the Fissile Material Cut-Off Treaty (FMCT), continue to exist in

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<sup>91</sup> "Status of World Nuclear Forces," *op cit.*

<sup>92</sup> Krieger, David, "How Many Nuclear Weapons Still Threaten Humanity?" The Nuclear Age Peace Foundation, (9 June 2011), <[http://www.wagingpeace.org/articles/db\\_article.php?article\\_id=252](http://www.wagingpeace.org/articles/db_article.php?article_id=252)> [accessed 2 August 2012].

<sup>93</sup> "Russia Country Profile," *op cit.*, "Recent Developments and Current Status."

<sup>94</sup> "Fact Sheet: US Nuclear Modernization Programs," The Arms Control Association, (August 2012), <<http://www.armscontrol.org/factsheets/USNuclearModernization>> [accessed 2 August 2012].

a state of diplomatic limbo, with little hope of being implemented in the immediate future. The general lack of urgency with which NWS have approached their Article VI obligations is troubling to say the least, as part of the legitimacy of the NPT rests on the idea that the terms of treaty will lead to NWS taking steps to reduce their nuclear advantage. If the NPT comes to be seen merely as a means for the NWS to maintain a nuclear weapons monopoly, then NNWS may no longer feel compelled to comply with the treaty themselves.

### **The IAEA**

The IAEA is another key component of the international nonproliferation regime. While the NPT, as a diplomatic agreement, lays out a framework for preventing the spread of nuclear assets, it is the IAEA that actually verifies that states are obeying the terms of this framework—essentially, the IAEA acts as a “nuclear inspectorate.”<sup>95</sup> Granted, that is far from the IAEA’s only purpose; it also seeks to facilitate nuclear cooperation among its 154 member states, assist states in utilizing nuclear science for peaceful purposes, and develop safety standards for the application of nuclear energy.<sup>96</sup>

However, it is the organization’s role as an inspector and verifier that is most relevant in the context of nuclear nonproliferation. The IAEA fulfills this component of its mission through its “safeguards system,” through which the organization audits and inspects civilian nuclear facilities around the world, and verifies that said facilities are being used appropriately, in accordance with the terms of the NPT.<sup>97</sup> Within the context of the safeguards system, the IAEA is able to conduct four types of inspections:<sup>98</sup> *ad hoc inspections* (“to verify a state’s initial report of nuclear

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<sup>95</sup> “IAEA Safeguards Overview: Comprehensive Safeguards Agreements and Additional Protocols,” International Atomic Energy Agency, <[http://www.iaea.org/Publications/Factsheets/English/sg\\_overview.html](http://www.iaea.org/Publications/Factsheets/English/sg_overview.html)> [accessed 23 July 2012].

<sup>96</sup> “The IAEA Mission Statement,” International Atomic Energy Agency, <<http://www.iaea.org/About/mission.html>> [accessed 23 July 2012].

<sup>97</sup> “Safeguards to Prevent Nuclear Proliferation,” The World Nuclear Association, (April 2012), <<http://www.world-nuclear.org/info/inf12.html>> [accessed 3 August 2012].

<sup>98</sup> Information about these inspections is drawn from “IAEA Safeguards Overview,” unless otherwise noted.



material or reports on changes thereto”); *routine inspections* (which can be carried out “according to a defined schedule” or on short notice); *special inspections* (supplementary inspections carried out in “unusual circumstances”)<sup>99</sup>; and *safeguards visits* (used to verify elements of a state’s facilities’ designs relevant for nonproliferation purposes).

The terms of the safeguards system differ slightly with regards to NNWS and NWS. For NNWS, the safeguards system exists primarily to ensure that nuclear materials and facilities are being used strictly for peaceful purposes.<sup>100</sup> In order to fulfill this goal, the IAEA requires NNWS to agree to “full-scope” safeguards, which apply to all of a state’s nuclear facilities, and mandate specific levels of “material accountability,” “physical security,” and “containment and surveillance.”<sup>101 102</sup> In contrast, NWS are able to specify which facilities the IAEA is allowed to inspect, and the inspections focus chiefly on ensuring “completeness and accuracy of records.”<sup>103 104</sup> Generally, military-oriented nuclear facilities are excluded from inspection. Also, it is important to note that all members of the nuclear weapons club, with the exceptions of Israel and North Korea, do allow for some degree of IAEA oversight with regards to their civilian facilities, though the level of access varies greatly.<sup>105</sup>

Additionally, IAEA member states can choose to sign an “Additional Protocol,” which grants the agency supplementary powers to conduct more thorough and comprehensive inspections within the framework of the safeguards

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<sup>99</sup> “International Atomic Energy Agency (IAEA),” (Washington, DC: Nuclear Threat Initiative, 2012), <<http://www.nti.org/treaties-and-regimes/international-atomic-energy-agency/>> [accessed 23 July 2012].

<sup>100</sup> “Safeguards to Prevent Nuclear Proliferation,” op cit.

<sup>101</sup> Ibid.

<sup>102</sup> From the previous source: “material accountability” refers to “tracking all inward and outward transfers and the flow of materials in any nuclear facility”; “physical security” refers to “restricting access to nuclear materials at the site of use”; and “containment and surveillance” refers to “use of seals, automatic cameras and other instruments to detect unreported movement or tampering with nuclear materials, as well as spot checks on-site.”

<sup>103</sup> “Safeguards to Prevent Nuclear Proliferation,” op cit.

<sup>104</sup> Consult the above source for a table detailing which civilian facilities each NWS allows the IAEA to inspect.

<sup>105</sup> “Safeguards to Prevent Nuclear Proliferation,” op cit.

system, with the specifics of the agreement varying by country.<sup>106 107</sup> At present, more than one hundred states have signed on to this more stringent standard.<sup>108</sup>

As with the safeguards system, it is important to note that the nature of the Additional Protocol differs between NNWS and NWS. With regards to a NNWS, the agreement helps the IAEA to better ensure that the state is not diverting nuclear materials to non-peaceful processes, and that it is not participating in any undeclared nuclear activities.<sup>109</sup> For a NWS, on the other hand, the Additional Protocol mainly serves to verify that the state's nuclear cooperation with other states, if it exists, is not in violation of the terms of the NPT.<sup>110</sup>

The IAEA is hampered by two key problems as it continues its work to inspect and verify nuclear programs around the world. First, as mentioned earlier, the organization lacks a standardized framework to punish states that are found in violation of the NPT. Essentially, the IAEA is only able to refer violator states to the United Nations, an institution frequently beset by internal divisions that prevent it from taking strong, decisive action.

Second, though Additional Protocols have been an immensely useful tool in helping the IAEA to fulfill its inspection duties, they are not mandatory. This proves problematic for the organization's ability to extensively inspect the nuclear programs of states without Additional Protocols.<sup>111</sup> As the IAEA itself pointed out in a 2011 report, an Additional Protocol grants the agency extensive access to a country's nuclear program that is critical to conducting a comprehensive and thorough inspection. According to the report:

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<sup>106</sup> "International Atomic Energy Agency (IAEA)," *op cit*.

<sup>107</sup> "International Safeguards," The United States Nuclear Regulatory Commission, (8 June 2012), <<http://www.nrc.gov/about-nrc/ip/intl-safeguards.html>> [accessed 23 July 2012].

<sup>108</sup> *Ibid*.

<sup>109</sup> "Safeguards to Prevent Nuclear Proliferation," *op cit*.

<sup>110</sup> *Ibid*.

<sup>111</sup> John Simpson, "Core Non-Proliferation Regime Problems: Non-Compliance and Universality," (Briefing seminar for the 2002 Preparatory Committee for the NPT Review Conference of 2005, 8-9 March 2002), <<http://www.mcis.soton.ac.uk/Annecy2002March/SIMPSON-Annecy.pdf>> [accessed 24 July 2012].

Under the additional protocols, States are required to provide the IAEA with an expanded declaration that contains information covering all aspects of their nuclear fuel cycle activities. States with additional protocols must also grant the IAEA broader rights of access to safeguards relevant locations and enable it to use the most advanced verification technologies. Previously, routine access was generally limited to specific “strategic points” in declared facilities. Additional protocols require States to provide access to any place on a nuclear site and to other locations where nuclear material is, or may be, present. States are required to provide access to all locations that are, or could be, engaged in activities related to the nuclear fuel cycle and, in cases where such access may not be possible, to make every reasonable effort to satisfy IAEA requirements without delay through other means.<sup>112</sup>

Thus, it is clear that the difference between a standard IAEA inspection and an Additional Protocol inspection is significant, to say the least. Without an Additional Protocol in place, it is much more difficult for the IAEA to definitively confirm that a nuclear weapons state’s nuclear materials are being properly managed, or that a non-nuclear weapons state’s civilian program is not actually being used for non-peaceful purposes.

#### **Other Treaties of Relevance**

Finally, it is important that this paper briefly discusses two additional treaties with particular relevance to the issues of nuclear security and nuclear terrorism, namely: the Convention on the Physical Protection of Nuclear Material (CPPNM) and the International Convention on the Suppression of Acts of Nuclear Terrorism (ICSANT).

The original version of the CPPNM entered into force in 1987, and focused primarily on mandating certain protections for nuclear materials in international transport; this international focus came as the result of the prevailing view that domestic nuclear security should be the responsibility of individual states.<sup>113</sup> However, the 9/11 attacks shifted this attitude greatly, and served as the impetus for an international effort to expand the CPPNM to cover domestic nuclear security.

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<sup>112</sup> "IAEA Safeguards Agreements and Additional Protocols: Verifying Compliance with Nuclear Non-Proliferation Undertakings," International Atomic Energy Agency, (Vienna, Austria: Director General's Office for Policy, 2011), p. 6.

<sup>113</sup> "Convention on the Physical Protection of Nuclear Material (CPPNM)," (Washington, DC: Nuclear Threat Initiative, 2012), < <http://www.nti.org/treaties-and-regimes/convention-physical-protection-nuclear-material-cppnm/> > [accessed 23 July 2012].

This resulted in the 2005 amendment to the CPPNM which “legally binds states to the protection of nuclear facilities and material in peaceful domestic use, storage, and transport,” and “provides for enhanced cooperation between states regarding the rapid location and recovery of stolen or smuggled nuclear materials,” among other components.<sup>114</sup> However, the amendment will not enter into effect until it is ratified by 97 of the convention’s 145 parties; at present, only 56 have done so.<sup>115</sup> Unfortunately, the United States is among those countries that have yet to ratify.

ICSANT, meanwhile, provides “pre-emptive measures that criminalize planning, threatening, and performing acts of nuclear terrorism,” “a clear definition of nuclear terrorism,” and “specifies how states should handle offenders and illicit materials when seized.”<sup>116</sup> The convention entered into force in 2007, but 61 of its 138 signatories have yet to ratify it, a group that once again includes the United States.

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<sup>114</sup> Ibid.

<sup>115</sup> Benjamin Kagel, "About Time: Bill to Enhance Nuclear Security Moves through House," *Arms Control Now*, The Arms Control Association, (13 July 2012), <<http://armscontrolnow.org/2012/07/13/about-time-bill-to-enhance-nuclear-security-moves-through-house/>> [accessed 24 July 2012].

<sup>116</sup> Ibid.

#### **Section 4: Policy Recommendations**

The issue of nuclear security in the post-Cold War world is a complex dilemma, and one that resists quick, simple solutions. Nonetheless, it is also clear that the policy recommendations proposed in this section will not be starting from scratch. Rather, a basic foundation of national, regional, and international initiatives to improve global nuclear security already exists, as has been detailed previously. Thus, improving nuclear security around the world will require building on these existing efforts, rather than starting entirely anew.

Any effort by the international community to prevent nuclear assets from falling into terrorist hands must be based on achieving two key objectives: (1) preventing any additional countries from acquiring nuclear weapons or weapons-grade materials; and (2) securing existing stockpiles of these weapons and materials. The former is important because a lower number of NWS will result in a lower probability of a state with inadequate security capabilities coming into possession of nuclear assets that it cannot protect. Logically, then, the international community should seek to minimize the number of states that possess nuclear weapons. Meanwhile, the latter objective is important because states that currently possess nuclear weapons are highly unlikely to relinquish them in the near future; thus, the international community must create conditions that will ensure that these existing assets do not fall into the wrong hands. The following recommendations for the US and the international community are organized with these two key objectives in mind.

##### **Objective 1: Prevent additional countries from acquiring nuclear weapons and/or weapons-grade materials.**

##### ***1. The international community must take steps to strengthen the NPT and IAEA.***

As detailed in Section 3, the NPT and IAEA have undoubtedly made a positive contribution to global society, providing a framework to limit the spread of nuclear

weapons. However, this framework is far from perfect, and could truly benefit from the following actions.

First, the international community should work to institute a standardized noncompliance mechanism to better enforce the NPT/IAEA framework. Having a standardized response to noncompliance would better serve said framework in deterring states from using their nuclear programs in ways that violate international nonproliferation norms.

Second, the international community needs to re-examine Article X of the NPT, and consider instituting more substantive sanctions for those states that use Article X to withdraw from the treaty after being found in noncompliance with the treaty's terms. The case of North Korea offers an instructive illustration of Article X's inherent flaws. As described earlier, the North Korean government exploited the NPT to acquire various nuclear technologies, and then used Article X to withdraw from the treaty, largely without repercussions, to pursue its nuclear weapons ambitions. The fact that Article X could be so blatantly abused is a clear indictment of its defects, and a sign that additional deterrents need to be put into place to prevent states from exploiting the NPT in this way.

One measure that has been suggested as a means of deterring NPT noncompliance and withdrawal would involve the UN Security Council issuing a generic, binding resolution mandating certain punitive measures in response to either of these two occurrences. In a working paper prepared in advance of the 2005 NPT Review Conference, the French government argued for a Security Council resolution that would institute a mandatory suspension of all nuclear assistance to countries found in violation of the NPT.<sup>117</sup> This is a sensible proposal, and a good start, but it could be strengthened even more by allowing the IAEA to utilize its

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<sup>117</sup> "Strengthening the nuclear non-proliferation regime," (Working paper submitted by France, Preparatory Committee for the 2005 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, Third Session, 4 May 2004), <[http://www.iaea.org/newscenter/focus/fuelcycle/france\\_npt2004.pdf](http://www.iaea.org/newscenter/focus/fuelcycle/france_npt2004.pdf)> [accessed 6 August 2012]: pp. 3-4.

authority, under Article XII of the IAEA statute, to “withdraw any materials and equipment made available [to the violator state] by the Agency or a [member state],”<sup>118</sup> so that violator states could not continue benefitting from IAEA-provided nuclear assistance in the wake of noncompliance.

Similarly, with regards to the issue of withdrawal, Pierre Goldschmidt, of the Carnegie Endowment for International Peace, has argued for a generic, binding Security Council resolution that would feature two key components: (1) a withdrawal from the NPT after treaty noncompliance would be classified as a “threat to international peace and security as defined under Article 39 of the UN Charter”; and (2) any nuclear materials and equipment that had been provided to the state under the auspices of IAEA-sponsored assistance programs would be “removed from that state under IAEA supervision.”<sup>119</sup> By declaring withdrawal from the NPT after noncompliance to be a threat to international peace, such a resolution would create a greater incentive for the Security Council to take tangible action against the state in question, as mandated by the UN Charter. Furthermore, Goldschmidt’s insistence on allowing the IAEA to seize materials and equipment from states withdrawing from the NPT after noncompliance would prevent such states from following the North Korean example of receiving IAEA assistance, withdrawing from the NPT, and then using IAEA assets to build nuclear weapons.

Most importantly, by making their recommended Security Council resolutions binding and generic, the proposals from the French government and Goldschmidt would bring some semblance of standardization to the matter of responding to proliferation crises, as the question of whether or not the UN should take action would not have to be debated every time a state violated or withdrew

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<sup>118</sup> “Agency Safeguards,” *Statute of the IAEA*, (Vienna, Austria: International Atomic energy Agency); <[http://www.iaea.org/About/statute\\_text.html#A1.12](http://www.iaea.org/About/statute_text.html#A1.12)> [accessed 6 August 2012].

<sup>119</sup> Goldschmidt, Pierre, “Measures Needed to Strengthen the Nuclear Non-Proliferation Regime,” in *NATO and the Future of the Nuclear Non-Proliferation Treaty*, edited by Joseph F. Pilat and David S. Yost, (Rome: NATO Defense College, 2007), pp. 52-53.

from the NPT. Rather, Security Council states would be essentially compelled to take some sort of punitive action, lest they be seen as reneging on a binding agreement.

Third, the world's NWS need to take a more substantive approach to honoring their obligations to Article VI of the NPT, by gradually reducing the size of their nuclear arsenals and working to ratify and implement treaties, such as CTBT and FMCT, which fall under the umbrella of these commitments. As mentioned in Section 3 of this paper, some progress has been made in the area of NWS disarmament, such as through the New START treaty passed by the US and Russia. However, while this progress is somewhat encouraging, it is not nearly enough to indicate a sincere effort by the NWS to honor the spirit of their Article VI commitments.

In preventing the spread of nuclear weapons, the perceived legitimacy of the global nonproliferation regime is crucial. This legitimacy is undermined by the NWS' general resistance to holding up their end of the NPT's central bargain. In time, if the NWS refuse to take steps to reduce their own nuclear capabilities, then the NPT could come to be seen by NNWS as a guarantor of the NWS' nuclear monopoly, rather than as part of an effort to enhance global security. If this were to happen, then certain NNWS may choose to pursue nuclear weapons themselves, rather than acquiescing to a NPT that is perceived as merely serving the interests of NWS. Therefore, it is crucial that members of the nuclear weapons club take steps beyond merely paying lip service to their Article VI commitments, so as to ensure the ultimate survival of the global nonproliferation regime. In the long run, this effort should involve a move towards complete nuclear disarmament, but in the interim, ratification of CTBT and FMCT would help to demonstrate that the NWS are, in fact, committed to fully honoring their NPT obligations.

Fourth, the international community must seek to expand the number of states signed on to Additional Protocols with the IAEA. Additional Protocols are immensely helpful tools for the IAEA, providing it with supplementary powers that allow it to conduct much more thorough inspections of nuclear programs and to



more effectively determine if these programs have met relevant non-proliferation regulations. However, at present, several states with “significant nuclear activities,” but no nuclear weapons (including Argentina, Brazil, Egypt, Syria, and Venezuela),<sup>120</sup> as well as three NWS (Pakistan, North Korea, and Israel),<sup>121</sup> have not yet signed such an agreement. To remedy this issue, the international community must pressure states that have not signed Additional Protocols to do so as soon as possible, for the benefit of the global nuclear security regime.

Pressuring such states into signing an Additional Protocol will require a significant effort from the United States, which, with regards to several of the aforementioned states, possesses the leverage needed to influence them into agreeing to more stringent IAEA oversight. Take Pakistan, for example. Of the three NWS that have not yet signed on to an Additional Protocol, Pakistan represents the country that could most plausibly be convinced to change its course. North Korea is unlikely to agree to an Additional Protocol as long as it remains diplomatically isolated on the world stage, while Israel is highly unlikely to invite additional scrutiny upon a nuclear program that it refuses to even acknowledge the existence of. Pakistan, however, may prove to be more malleable, mainly due to the substantial amount of US aid that it receives. For the fiscal year 2013, the Obama administration has requested \$2.23 billion for military and economic assistance to the Islamic Republic.<sup>122</sup> If the Obama administration simply made a portion of this assistance contingent upon agreement to an Additional Protocol, Pakistan could very well be compelled to do as the US wished. Similarly, the US could leverage its economic and military aid to Egypt, as well as its trade relations with Venezuela,

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<sup>120</sup> Mark Hibbs, "Nuclear Suppliers Group and the IAEA Additional Protocol," Carnegie Endowment for International Peace, (18 August 2010), <<http://www.carnegieendowment.org/2010/08/18/nuclear-suppliers-group-and-iaea-additional-protocol/ep>> [accessed 10 August 2012].

<sup>121</sup> Safeguards to Prevent Nuclear Proliferation," op cit.

<sup>122</sup> "Direct Overt US Aid Appropriations and Military Reimbursements to Pakistan, FY 2002-FY2013," (Prepared by the Congressional Research Service for distribution to multiple congressional offices, July 27, 2012), <<http://www.fas.org/sgp/crs/row/pakaid.pdf>> [accessed 3 August 2012].

Brazil and Argentina, and use these relationships to pressure these countries into signing an Additional Protocol.

***2. The US and the international community should explore means of deterring nuclear proliferation outside of the NPT/IAEA framework.***

Though the NPT and IAEA obviously play a major role in preventing nuclear proliferation, these two institutions need not be the sole method by which this goal is pursued by the international community. Rather, there exist certain deterrents outside of the NPT/IAEA framework that would greatly aid in the global effort against nuclear proliferation, as detailed below.

First, the concept of contract sanctions is one that could potentially be used by the US and other major financial powers to punish states that have violated the terms of the NPT, or withdrawn from the treaty entirely. Originally proposed by the Center for Global Development as a means of punishing the Assad regime for its human rights abuses in Syria, contract sanctions would involve major financial powers, such as the US and UK, declaring that all contracts with a given government are illegitimate, and would not have to be honored by a successor regime.<sup>123</sup> As pointed out by the CGD, this would severely damage the targeted country's economy, as the risk of doing business in said country would increase exponentially, making it more difficult for it to attract foreign investment.<sup>124</sup> Moreover, unlike nonproliferation initiatives involving international bodies such as the UN, contract sanctions against states that violate the NPT would not require broad-based consent from the global community.<sup>125</sup> Thus, if the US and UK felt the need to impose contract sanctions on, say, North Korea, they could do so without fear of the action being blocked by a Russian or Chinese veto. Granted, contract sanctions would only deter corporations and governments from investing in a targeted country if that

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<sup>123</sup> Elliott, Kimberly Ann and Owen Barder, "Preventing Odious Obligations: A New Tool to Pressure Syria's Bashar Assad," (Washington, DC: The Center for Global Development, 2012), <[http://www.cgdev.org/files/1426026\\_file\\_Elliott\\_Barder\\_SyriaObligations.pdf](http://www.cgdev.org/files/1426026_file_Elliott_Barder_SyriaObligations.pdf)> [accessed 6 August 2012], p. 1.

<sup>124</sup> Ibid.

<sup>125</sup> Ibid., p. 2.

country's government could conceivably collapse in the near future. Thus, the effectiveness of contract sanctions in enforcing compliance with the NPT would essentially be directly proportional to the perceived instability of the regime in question.

Second, the international community should work to officially designate illicit nuclear proliferation as a crime against humanity. Though nuclear nonproliferation currently exists as a widely recognized norm within the global community, making illicit nuclear transfer a crime against humanity would serve to further deter would-be proliferators. In a 2007 *Washington Post* editorial, Anne-Marie Slaughter and Thomas Wright put forth the case for making nuclear proliferation a crime against humanity:

Making nuclear transfer a crime against humanity captures the enormity of the offense and would dramatically increase the cost of getting caught. Nuclear transfer threatens the lives of millions of people. It merits a place in infamy alongside genocide and other evils. Creating a nuclear transfer taboo would strip away feigned protestations of innocence and illusions of a victimless crime. It would stigmatize black-market financiers and other facilitators of nuclear transfers as the ultimate merchants of death.<sup>126</sup>

A "crime against humanity" classification would also greatly increase the political costs incurred by governments that shelter proliferators, such as Pakistan with regards to AQ Khan, and might pressure these governments into handing over such individuals to international authorities.<sup>127</sup> In addition, this designation need not, and in fact should not, apply merely to those individuals who steal or receive nuclear assets and spread them to other actors. Rather, individuals within a state's nuclear establishment who, either through negligence or malevolence, allow nuclear assets to fall into the hands of rogue elements must also be held responsible for their actions. Allowing illicit nuclear transfer to be defined as a crime against humanity in such a broad way would serve to increase accountability within the

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<sup>126</sup> Anne-Marie Slaughter and Thomas Wright, "Punishment to Fit the Nuclear Crime," *The Washington Post*, (2 March 2007), <<http://www.washingtonpost.com/wp-dyn/content/article/2007/03/01/AR2007030101326.html>> [accessed 6 August 2012].

<sup>127</sup> *Ibid.*

world's nuclear complexes, as individuals within these organizations would know that a failure to maintain adequate security could lead to massive legal repercussions. All in all, it is clear that making nuclear transfer a crime against humanity would only help efforts to keep nuclear weapons from spreading to additional countries.

There exist several different ways in which illicit nuclear transfer could come to be labeled a crime against humanity. The most obvious way would be for the international community to pursue an amendment to the Rome Statute of the International Criminal Court (ICC). The ICC has international jurisdiction over crimes against humanity, but nuclear transfer is not included in its list of acts that constitute such a crime. Adding nuclear transfer to this list would require the support of 2/3 of the state parties to the Rome Statute; gaining this support should not be exceedingly difficult, as nuclear nonproliferation is already a fairly-established international norm. In other words, very few states would openly come out in favor of a state's right to spread nuclear weapons to other countries, and so an amendment to add nuclear transfer to the Rome Statute would be unlikely to encounter much resistance.

A less-than-ideal alternative would be for the UN Security Council to issue a resolution designating nuclear transfer as a crime against humanity. It is difficult to foresee any of the five Security Council members opposing such a resolution, so this would be a feasible measure. However, a Security Council resolution would be a less optimal solution than an amendment to the Rome Statute. While a Rome Statute amendment would empower the ICC to take action against individuals accused of proliferating, or facilitating the proliferation of, nuclear assets, it is unclear what actions, if any, would follow a Security Council resolution. Nonetheless, a resolution would bring the idea of "nuclear proliferation as a crime against humanity" into the international mainstream, and thus must be seen as preferable to taking no action at all.

***3. Increase incentives for Iran to dismantle its nuclear program.***

At present, Iran serves as one of the most visible battlegrounds in the global effort against nuclear proliferation.<sup>128</sup> Though the Iranian government has consistently denied that it harbors ambitions to join the nuclear weapons club, its lack of transparency with regards to its nuclear program has unsettled a significant portion of the international community, and has led to the US, EU, and UN levying several rounds of sanctions against it. Despite this, however, Iran has persisted with uranium enrichment activities, feeding into concerns that it intends to join the ranks of the world's NWS.

Unfortunately, the discourse over Iran's nuclear program is frequently plagued by a tendency towards hyperbole and fear-mongering, especially with regards to how exactly Iran would utilize a nuclear arsenal. Though a detailed analysis of this hypothetical situation lies outside the scope of this paper, the contention that a nuclear-armed Iran would engage in such extraordinarily reckless activities as deliberately channeling nuclear weapons to terrorist groups or launching a nuclear attack on Israel must be looked upon with a degree of skepticism.<sup>129</sup> As has been argued elsewhere, by experts like Trita Parsi and others,<sup>130</sup> an Iran with nuclear weapons is unlikely to deviate from the generally pragmatic, rational foreign policy that it has followed for decades. Ultimately, however, speculation about how Iran would utilize its hypothetical nuclear weapons capability is simply that—speculation.

What is not speculation, however, is that if the international community is to prevent nuclear weapons and materials from falling into terrorist hands, it is in its

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<sup>128</sup> Background information about Iran's nuclear program is drawn from the following source, unless otherwise noted: "Iran Country Profile: Nuclear," (Washington, DC: Nuclear Threat Initiative 2012), <<http://www.nti.org/country-profiles/iran/nuclear>> [accessed 25 July 2012].

<sup>129</sup> The aforementioned brand of hyperbole is nicely encapsulated in the Anti-Defamation League's assessment of the Iranian nuclear threat, available at: <[http://www.adl.org/main\\_International\\_Affairs/iranian\\_threat\\_faq.htm](http://www.adl.org/main_International_Affairs/iranian_threat_faq.htm)>

<sup>130</sup> Trita Parsi, *Treacherous Alliances: The Secret Dealings of Israel, Iran, and the United States*, (New Haven, CT: Yale University Press, 2007), p. 270; Similar arguments are made by Kyle Beardsley and Sarah Kreps in a feature by *The Atlantic*: Micah Zenko, "What Will Iran Do If It Gets a Nuclear Bomb?" *The Atlantic*, (22 February 2012), <<http://www.theatlantic.com/international/archive/2012/02/what-will-iran-do-if-it-gets-a-nuclear-bomb/253430/#>> [accessed 26 July 2012].

best interest to prevent additional countries from developing these assets. After all, a greater number of states with nuclear weapons simply results in more sources from which terrorists could acquire their own nuclear capabilities. In this context, a nuclear-armed Iran, even if the country's government continued to adhere to a rational foreign policy, is simply antithetical to the cause of global nuclear security.

How the international community could best bring about an end to the Iranian nuclear program is, of course, a point of great contention. Though sanctions levied by the international community have certainly taken a toll on the Iranian economy, they have yet to bring about an Iranian capitulation on the nuclear issue.<sup>131</sup> Meanwhile, the argument for a military strike against Iran's nuclear facilities has been an ever-present component of the Iranian nuclear debate for quite some time. However, it is doubtful that an Israeli or US attack would permanently destroy the Iranian nuclear program; rather, it is more likely that such an attack would merely set the program back several years.<sup>132</sup>

Ultimately, the best way to bring about an end to the Iranian nuclear program would likely be a US-oriented "grand bargain" with Tehran. In exchange for the dismantling of its nuclear program, the US could provide Iran with a normalization of diplomatic relations, a guarantee of non-aggression, economic assistance, and, potentially, equipment for Iran to pursue a strictly-civilian nuclear program. Such a deal would truly be a "win-win," substantially benefitting Iran in the political and economic spheres, while also enhancing global nuclear security.<sup>133</sup>

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<sup>131</sup> "Iran to cut spending as sanctions take toll," *The Gulf Times*, (25 July 2012), <[http://www.gulf-times.com/site/topics/article.asp?cu\\_no=2&item\\_no=521229&version=1&template\\_id=37&parent\\_id=17](http://www.gulf-times.com/site/topics/article.asp?cu_no=2&item_no=521229&version=1&template_id=37&parent_id=17)> [accessed 27 July 2012].

<sup>132</sup> "Bombing Iran," *The Economist*, (25 February 2012), <<http://www.economist.com/node/21548233>> [accessed 27 July, 2012]

<sup>133</sup> Interestingly enough, Iran actually offered to make such a "Grand Bargain" with the US in the aftermath of the US invasion of Iraq 2003. In exchange for a lifting of US sanctions and a guarantee that the US would not seek to replace its theocratic leadership, "Iran offered to drop its nuclear program, to end its backing of Islamic Jihad to help transform Hezbollah into a social-political organization, to assist the US in winning the war in Afghanistan, to trade members of Al-Qaida it had detained for members of a group that had terrorized Tehran detained by the US in Iraq, and other concessions." Unfortunately, the Bush Administration chose to reject this offer. Source: Tom O'Donnell, "A Grand Bargain is Still Possible if

**Objective 2: Ensure that existing nuclear stockpiles are sufficiently secure.**

***1. Members of the international community should ratify CPPNM's 2005 amendment and ICSANT.***

CPPNM (including its 2005 amendment) and ICSANT represent common-sense measures that would, among other things, establish common standards for domestic nuclear security and enhance international cooperation in the realm of preventing nuclear terrorism. To put it simply, there is no reason why these measures should *not* be ratified. Fortunately, in both cases, there does appear to be some progress being made; related legislation was approved by the US House of Representatives in June 2012, and merely awaits approval by the Senate. Hopefully, US ratification of these two treaties will encourage other resistant states to follow suit.

***2. The US should continue its nuclear security assistance programs with Russia and Pakistan, and continue existing policies towards North Korea.***

This particular recommendation will place the onus of responsibility primarily on the United States, which has already initiated nuclear security programs with Russia and Pakistan, and has been intermittently engaged in diplomatic talks with North Korea for the past two decades.

In the case of Russia, the US should continue to upgrade the security of the Russian nuclear complex through the Nunn-Lugar initiative. Granted, given the spending-related anxieties that currently pervade US domestic politics, the idea of continuing to pour millions of dollars into the Russian nuclear complex might strike fiscal hawks as wasteful spending. However, the strengthening of Russian nuclear security truly constitutes a national security priority, and should be treated as such. Of course, the US government's continued financing of these upgrades should be coupled with technical education for Russian nuclear officials, so that, when the US

eventually does withdraw its funding, the Russian nuclear establishment will be able to maintain the upgrades that were made.

Further US engagement with Pakistan will require some divergences from prior US attempts to improve Pakistani nuclear security, such as the \$100 million program launched in 2001. Clearly, as detailed in Section 2, Pakistan's nuclear complex is in need of security assistance. However, the aforementioned \$100 million program was plagued by a lack of accountability and transparency from Pakistan, which resulted in the program not being nearly as effective as it could have been. Moving forward, the US should continue to provide nuclear security aid to Pakistan, but must require Islamabad to hold itself to much higher standard of transparency, so as to ensure that US funds are being spent effectively and appropriately. To enforce this transparency, the US could link its nuclear security assistance to the rest of its military aid to Pakistan. Thus, if the Pakistani government is insufficiently transparent in its allocation of nuclear security funds, the US could revoke portions of the rest of its military aid. Ideally, this linkage would compel Pakistan to approach its use of US nuclear security assistance with a greater sense of accountability.

In the case of North Korea, the US's power to directly affect the country's nuclear security is somewhat more limited, as the US cannot provide nuclear security aid to the Kim regime without implicitly accepting it as a legitimate NWS. Given the US government's repeatedly-demonstrated opposition to a nuclear North Korea, such a concession seems very unlikely to happen. Thus, the US should continue interdiction operations to prevent North Korea from transferring its nuclear assets to external agents, and also continue to engage with it in the context of multi-party nuclear negotiations.<sup>134</sup>

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<sup>134</sup> While it is possible that these negotiations could yield a "Grand Bargain" similar to the theoretical agreement described in the context of Iran's nuclear program, North Korea rejected a similar offer made by South Korea in 2009 (source: [http://www.koreatimes.co.kr/www/news/nation/2009/09/113\\_52797.html](http://www.koreatimes.co.kr/www/news/nation/2009/09/113_52797.html)). This would seem to indicate



**3. The US should enhance its nuclear attribution capabilities, in order to deter states from “losing” nuclear weapons and materials.**

Nuclear attribution refers to the process of “identifying the source of nuclear or radioactive material.”<sup>135</sup> In a 2007 essay for *The Washington Quarterly*, Caitlin Talmadge described how the process works:

...[Every nuclear weapon] has signatures—physical, chemical, elemental, and isotopic properties that reveal something about what the weapon contained and how it was made...They can also help determine the material’s age, providing further clues about its origins. In combination, these various signatures may help narrow the type of reactor from which the plutonium came or suggest the enrichment process used to make the uranium. When compared against a database of known reactor types or a sample of known highly enriched uranium stockpiles, it may become possible to determine the material’s origins or at least to exclude certain sources and then identify the culprit through a process of elimination when combined with other intelligence and data about the situation.<sup>136</sup>

As Talmadge goes on to point out, nuclear attribution would allow the US to hold states more accountable for the security of their nuclear arsenals.<sup>137</sup> This would, ideally, result in national governments assigning a higher level of priority to nuclear security, as they would be aware that, if a nuclear weapon from their arsenal was used by a terrorist group, the US would be able to determine the weapon’s source, and take retributive action accordingly.

Currently, two obstacles stand in the way of the US possessing a credible ability to trace nuclear explosions back to their source: (1) minimal US technical capabilities and (2) the lack of a comprehensive nuclear signature database.

In the early stages of the Cold War, the US possessed considerable nuclear attribution capabilities, utilizing the process mainly to analyze Soviet nuclear tests.<sup>138</sup> However, following a gradual decrease in the USSR’s use of above-ground

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that North Korea is not interested in such a sweeping agreement, but it does remain possible that the regime’s new leader, Kim Jong-un, may be more receptive than his father was.

<sup>135</sup> Caitlin Talmadge, “Deterring a Nuclear 9/11,” *The Washington Quarterly*, vol. 30, no. 2, (Spring 2007): p. 25.

<sup>136</sup> *Ibid.*

<sup>137</sup> *Ibid.*, p. 32.

<sup>138</sup> *Ibid.*, p. 27.

testing,<sup>139</sup> and the eventual end of the Cold War, this capability has been greatly diminished, with a 2010 study by the National Research Council labeling the US's ability to identify nuclear sources as "fragile and eroding."<sup>140</sup> The Council's report cited several reasons for this decline in capability, including the absence of a central authority responsible for attribution-related activities, as well as a general lack of personnel, funding, and other resources.<sup>141</sup>

The lack of an international database of nuclear signatures constitutes another obstacle to the US's attribution aspirations. Even if the US possessed the technical capabilities to examine the aftermath of a nuclear explosion, it would not be able to determine the source of the nuclear material without having a database of nuclear signatures from different countries against which it could compare its findings. Presently, the US does possess a database of sorts, but with Pakistan, North Korea, China, India, and Israel refusing to provide data, it is of very limited utility.<sup>142</sup>

Clearly, nuclear attribution would help to encourage NWS to ensure the security of their arsenals. Thus, the US should take the following steps to enhance its capabilities in this arena. First, the US government needs to treat nuclear attribution as a national security priority, create a designated body to oversee all attribution-related programs, and invest in the modern facilities, upgraded equipment, and skilled personnel needed to improve its capabilities in this field. Second, the US needs to convince all NWS to provide their nuclear signatures, for use in a comprehensive international database. Of course, these states will likely be reluctant to provide such sensitive information, but certain steps could be taken to "grease the wheels of [the] process," as Talmadge details in her essay.<sup>143</sup> For example, the US could share its own signatures with the resistant countries, and

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<sup>139</sup> Ibid.

<sup>140</sup> William J. Broad, "Nuclear Forensics Skill Is Declining in US, Report Says," *The New York Times*, (29 July 2010). <<http://www.nytimes.com/2010/07/30/us/30nuke.html>> [accessed 31 July 2012].

<sup>141</sup> Ibid.

<sup>142</sup> Talmadge, "Deterring a Nuclear 9/11," op cit., p. 29.

<sup>143</sup> Ibid.

house the database within the IAEA, so as to assuage fears that the US would merely be using the database for intelligence purposes.<sup>144</sup>

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<sup>144</sup> *ibid.*

### **Section 5: Conclusion**

In the aftermath of the Cold War, the nature of the nuclear threat facing the world has been fundamentally changed. If a nuclear weapon devastates a major city in our lifetime, it will, more likely than not, be detonated by a terrorist group, rather than a national military. However, such a tragedy would not happen without a state being involved in some capacity. At some point, the terrorist perpetrators would have had to steal nuclear assets from a state-run facility, or have those assets given to them from someone within a state's nuclear complex. As the unfortunate examples of Russia, Pakistan, and North Korea demonstrate, the probability of this happening is greater than many would care to admit.

Fortunately, the threat of nuclear assets falling into terrorist hands is not one that has been entirely ignored by the international community. In fact, there exists a framework of US-led assistance programs, nonproliferation agreements, and various diplomatic initiatives that have made substantive contributions to the effort to keep nuclear weapons and materials out of the hands of terrorists. This framework, of course, is far from perfect, but it is somewhat comforting to know that future efforts to enhance nuclear security around the world can be built on an existing foundation.

Ultimately, it cannot be denied that the prospect of terrorist-controlled nuclear weapons is a serious threat, and one that could lead to a truly horrendous catastrophe for humanity. What should also be clear at this point, however, is that the international community is not powerless in the face of this potential calamity. Through a combination of efforts by the United States, other nuclear weapons states, and the broader international community, steps can be taken to bolster global nuclear security and ensure that a terrorist organization never comes to possess mankind's deadliest weapon.

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