STRENGTHENING THE NUCLEAR, BIOLOGICAL, AND CHEMICAL WEAPONS NONPROLIFERATION REGIMES

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ABSTRACT

When the United States eventually ceased negotiations in the United Nations Security Council and invaded Iraq in 2003 with a stated goal of quelling the use or spread of weapons of mass destruction (WMD) from that country, it became apparent that institutions associated with international security would have to be strengthened in order to assure states that they could effectively orchestrate multilateral measures to counter WMD proliferation. Because of state necessity to first and foremost protect national interest, without more effective international nonproliferation regimes, countries will continue to take unilateral action against perceived WMD threats. This analysis will briefly survey theory associated with institutions and regimes. It will then analyze the perils posed by WMD, weaknesses of the WMD nonproliferation regimes, and measures being taken or proposed to ameliorate those weaknesses. It will conclude with twelve policy recommendations which, if implemented, would assist in strengthening the worldwide WMD nonproliferation structures.

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STRENGTHENING THE NUCLEAR, BIOLOGICAL, AND CHEMICAL WEAPONS NONPROLIFERATION REGIMES

INTRODUCTION

When the United States ceased 2003 negotiations in the UN Security Council and took enforcement action against Iraq with the intent to quell the spread or use of weapons of mass destruction (WMD) from that country, many realized that considerable change would be necessary for traditional nonproliferation institutions to influence state practice in an emerging era of supposedly imminent threats. It is now apparent that Iraq did not possess WMD at the time of the coalition invasion, but the perceived threat that under-girded the action, the recent use of anthrax and ricin, the revelations about the Abdul Qadeer Khan network, and North Korea and Iran's nuclear dabbling have spurred clarion calls from all corners of the globe, including America, to reform existing nonproliferation structures so the need for military action to deal with these threats will be lessened.

Regardless of whether a danger from Iraq existed or not, the peril posed from proliferation of WMD into the hands of terrorists or hostile states is not lessening with time. If the world does not wish to see more unilateral action in the face of perceived imminent threats, international institutions must change in order to respond in a timely manner so states do not feel their security is dwindling as others debate the imminence of a problem—as happened before the Iraq War began. U.S. Vice President Dick Cheney summarized the Bush Administration's anxiety on this subject: "To accept the view that action by America and our allies can be stopped by the objection of foreign governments [in the United Nations] that may not feel threatened is to

confer undue power on them, while leaving the rest of us powerless to act in our own defense."[1] The United States was clearly wrong about the actual threat posed by Iraq, but its anxiety could have been lessened if the international nonproliferation regimes were more robust.

In his speech at the opening session of the General Assembly in 2003, UN Secretary-General Kofi Annan criticized unilateral action taken in the manner of the Iraq War. However, he also addressed the worries of the United States (as expressed above by Mr. Cheney) and others that threats from WMD are still imminent and called for institutional changes in order to combat the evolving calculus of destructive power. He said that "it is not enough to denounce unilateralism, unless we also face up squarely to the concerns that make some States feel uniquely vulnerable, since it is those concerns that drive them to take unilateral action. We must show that those concerns can, and will, be addressed effectively through collective action." He continued by postulating that because of the dangers posed by WMD proliferation, the world is at "a fork in the road. This may be a moment no less decisive than 1945 itself, when the United Nations was founded."[2]

Mohamed ElBaradei, Director-General of the International Atomic Energy Agency (IAEA), echoed Annan's words by noting that institutions which deal with nonproliferation are "under a great deal of stress. … The security threats are changing, and with it our response needs to change."[3] ElBaradei has been an outspoken advocate of nonproliferation reform, and many of his proposals are beginning to take shape. Most important, however, is ElBaradei's note that WMD proliferation is detrimental to all in the long-run: "We are facing now the threat of

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[1] Carla Anne Robbins, "The U.N.: Searching for Relevance," *Wall Street Journal* (21 October 2003): A1.
[2] Kofi Annan, Remarks at the General Assembly of the United Nations, UN Document A/58/PV.7 (23 September 2003), at <http://ods-dds-ny.un.org/doc/UNDOC/GEN/N03/527/97/PDF/N0352797.pdf?OpenElement>, accessed 4/23/04
[3] Arms Control Association, "Curbing Nuclear Proliferation: An interview with Mohamed ElBaradei," *Arms Control Today* (November 2003): 3.

proliferation of weapons of mass destruction which is everybody's fight. … It's either all we win or everybody would lose."[4]

This analysis will survey the changing structure of three international institutions in particular—the nuclear, biological, and chemical weapons nonproliferation regimes. It will outline the general threat that WMD proliferation poses to world peace and the weaknesses of these institutions. It will then examine some of the changes proposed by world leaders and academics to strengthen these structures, and will conclude with twelve policy recommendations which could help these regimes become increasingly more influential and stable.

DEFINITIONAL AND THEORETICAL UNDERPINNINGS

To properly understand the changing role of international institutions in WMD nonproliferation, it is first necessary to define "nonproliferation" and "weapons of mass destruction," as well as establish a working definition of "international institution" and the main institutional components which relate to nonproliferation, namely the organization, the convention, and most importantly, the regime.

Nonproliferation: "Nonproliferation" encompasses action taken to stop the spread of something—in this case the spread of nuclear, biological, and chemical weapons—from actors which possess that thing or its component parts, or who could duplicate it or its parts. A similar, more robust, concept is that of "counter-proliferation." With WMD, counter-proliferation occurs when nonproliferation fails or is weakening. States take action to "counter" the spread of dangerous weapons and reverse proliferation, often by using coercive measures. The United States' past goal to eradicate WMD materiel in Iraq could have been considered an effort to

[4] International Atomic Energy Agency, "WMD Threats 'Everybody's Fight', Director General ElBaradei Says" (19 March 2004), at <http://www.iaea.org/PrinterFriendly/NewsCenter/News/wmd_threats1903.html>, accessed 3/20/04.

practice counter-proliferation, as could the successful project to remove nuclear weapons components from Libya.

Counter-proliferation activities are used to strengthen nonproliferation norms, and ultimately the end-goals of both are identical—to stop illicit proliferation. Because of this and for purposes of simplicity, this thesis will use the term "nonproliferation" generically to encompass all activities meant to stop the spread of WMD.

Weapons of Mass Destruction: This thesis will follow traditional models in assuming that nuclear, biological, and chemical weapons are weapons of mass destruction. In reality, these models are beginning to change. Radiological weapons are often added to the WMD profile, although a regime to deal specifically with them has not yet emerged. They will be addressed within the structure of nuclear nonproliferation. Chemical weapons (CW) cannot technically be called WMD because they do not have the destructive effects of nuclear or biological weapons (BW). Some scholars refer to them as weapons of mass terror, perhaps, but not mass destruction. Nevertheless, inasmuch as states still consider them part of the WMD mix, this analysis will include chemical weapons. Finally, unconventional weapons of mass destruction exist which are not dealt with at all in this analysis. For example, using the 9/11 planes as highly destructive missiles could put them in the category of unconventional WMD,[5] but because these threats vary so widely, they will not be included herein, despite the fact that they may pose a much greater peril than that caused by traditional WMD.

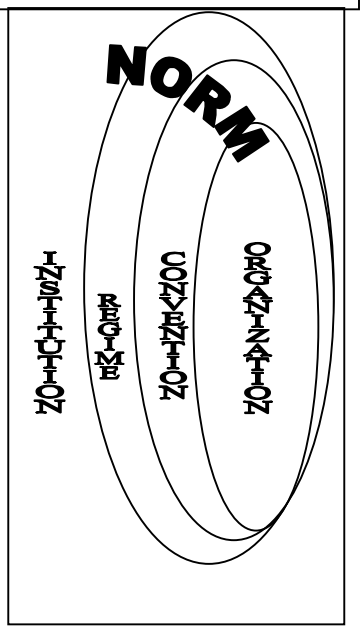
International Institution: An international institution is a "persistent and connected set of rules (formal or informal) that prescribe behavioral roles, constrain activity, and shape

[5] I first heard this idea presented in Professor Robert Pfaltzgraff's "Proliferation—Counter-proliferation and Homeland Security" seminar at the Fletcher School of Law and Diplomacy, Tufts University.

expectations."[6] As noted above, institutions can be classified into three general types: organizations, conventions, and regimes.

International Organization: An international organization is a "set of rules that have been formalized and are associated with bureaucratic structures capable of acting."[7] Quite often, international organizations will have a physical presence with a bureaucracy, a secretariat to run the daily affairs, and a plenary body to conduct inter-actor business. Within this analysis, key international organizations are the United Nations (UN), the International Atomic Energy Agency (IAEA), and the Organization for the Prohibition of Chemical Weapons (OPCW).

Figure 1—Elements of an Institution



Convention: An international convention can be a treaty—a set of rules and norms specified in writing and agreed to by states—or "sets of informal or unwritten rules that states understand" naturally.[8] Another term for this more informal convention is the concept of "customary law"—that some international activities are "just understood" to be right or wrong and are practiced by a large majority of states regardless of whether a formal treaty exists to codify that law. Key conventions referred to in this analysis are the nuclear Nonproliferation Treaty (NPT), the Chemical Weapons Convention (CWC), and the Biological and Toxin Weapons Convention (generally shortened as the "Biological Weapons Convention," or BWC), as well as something that the United States would like to become customary law—the Proliferation Security Initiative (PSI).

[6] As defined by Darren Hawkins, BYU Assistant Professor of Political Science, in his course on "International Organization," notes in possession of author.
[7] Hawkins notes.
[8] Ibid.

Regime: An international regime is perhaps the least structured and most inclusive form of international institution. According to Stephen Krasner, a leading political theorist, regimes are "implicit or explicit principles, norms, rules, and decision-making procedures around which actors' expectations converge in a given area of international relations."[9] Regimes are built upon norms and may encompass conventions and organizations. For example, the anti-terrorism regime includes twelve international conventions, one General Assembly declaration, three Security Council resolutions, and a special Security Council committee, all to uphold the norm that terrorism is a threat to international security and should be eradicated.[10] The regime is the fundamental level upon which this analysis will discuss nonproliferation. The WMD nonproliferation regimes are sets of "principles, norms, rules, and decision-making procedures" which dictate how proliferation can or cannot occur.

Table 1—Regime Types and Monitoring Mechanisms

TYPE OF REGIME	MONITORING
Declaratory	None
Promotional	Self-Reporting
Implementation	IGO Monitoring
Enforcement	Supranational Authority

Four types of regime exist, each of which depends on monitoring and enforcement capabilities: The first is a "declaratory regime," wherein states rhetorically profess the importance of a given norm, and that is all. They take no action, and no monitoring by organizations takes place. Second is a "promotional regime," in which states profess the importance of a norm and some of them take action. All are supposed to self-report to a political or expert body, often enshrined within an international organization. Although that body can pressure states to report, no established verification measures exist to ensure that states are telling the truth, and states are not punished if they choose not to report. These regimes can be somewhat effective if organizations that states report to use a "name and shame"-type strategy to induce them to submit updates. If they do not

[9] Stephen D. Krasner, "Structural Causes and Regime Consequences: Regimes as Intervening Variables," in *International Regimes*, ed. Stephen D. Krasner (Ithaca: Cornell University Press, 1983), 2.
[10] Hawkins notes.

report, the organizations announce it to the world, which is embarrassing. This tactic has a surprising amount of influence in convincing states to report on their activities.

Third is an "implementation regime," in which international organizations actively monitor adherence to the principles of the regime. Fourth is an "enforcement regime," wherein supranational bodies have the authority to make binding decisions based on the instruction of organizations (which are sometimes the supranational bodies themselves) that monitor the regime.[11]

Table 2—State Responses to Regime Norms

TYPE OF RESPONSE
No Change
Denial
Tactical Concessions
Prescriptive status
Rule-Consistent Behavior

Thomas Risse and Kathryn Sikkink argue that states will espouse different attitudes concerning the norms within the regime, and this is what defines what type of regime emerges. When the norms that create the regime are first established by activist groups or states, other countries will follow a path that will include one or more of five steps: (a) No change. Those who do not agree with the enunciated norms in the new regime will simply ignore that it exists. (b) Denial. States that disagree with the norms but do not wish to be seen as contrary to general views will deny that they are taking action which violates the norms within the regime. (c) Tactical concessions. States will change peripheral behaviors in order to appear like they are complying with the rules of the regime. (d) Prescriptive status. States will rhetorically agree that not complying with the given norms is wrong and will comply to an extent, even if they still do not comply in full. (e) Rule-consistent behavior. At first states may change behavior without actually believing in the norms, but as they rhetorically support given actions and make tactical

[11] Hawkins notes; and Thomas Risse and Kathryn Sikkink, "The Socialization of International Human Rights Norms into Domestic Practices: Introduction," in *The Power of Human Rights: International Norms and Domestic Change*, ed. Thomas Risse, Stephen C. Ropp, and Kathryn Sikkink (Cambridge: Cambridge University Press, 1999), 21-35. This is a discussion of international human rights norms and regimes, but the principles seem to apply equally as well to other regimes.

concessions, eventually the process builds momentum to the point where states will change national laws and practices in order to comply with the rules of the regime.[12]

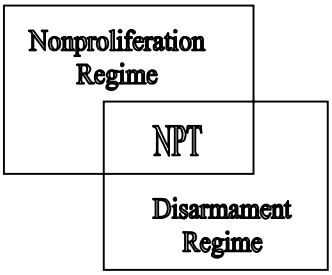
The Nuclear Nonproliferation and Disarmament Regimes: These principles can be illustrated within the nuclear nonproliferation and disarmament regimes. The cornerstone of the nuclear nonproliferation regime is the Nonproliferation Treaty (NPT), although other elements of the regime include Security Council (SC) statements, the Nuclear Suppliers Group, the Proliferation Security Initiative, the evolving Fissile Material Cutoff Treaty (FMCT), and even the ideas espoused within the defunct Baruch Plan. All of these mechanisms revolve around the norm that nuclear proliferation creates instability. The regime itself is in the implementation stage—even though some additional measures are needed to strengthen its ability to monitor, the IAEA is the designated monitoring mechanism. Theoretically this regime should be in the enforcement stage—the Security Council has the authority to implement directives given by the IAEA—but rarely has enforcement occurred. If the Security Council were to uphold George W. Bush's recommendation to pass a resolution outlawing proliferation, however, this regime would be strengthened and could become an enforcement regime if the SC is willing to back its resolution with enforcement measures.

Different states fall into varying categories of compliance within the nonproliferation regime. A taxonomy of regime observance can be classified as proliferation (no change)→ denial of proliferation→ tactical concessions (agreeing that proliferation is wrong and making changes to look like a state is not proliferating)→ prescriptive status (stopping most proliferation for any reason, altruistic or otherwise)→ rule-consistent behavior (enacting laws against proliferation and living by the nonproliferation norms). Pakistan, for example, is located near the "prescriptive status" stage. Some in the country would probably like to proliferate more if

[12] Risse and Sikkink, 21-35.

possible, but conditions since the exposition of A.Q. Khan are making that difficult and the government rhetorically supports nonproliferation. Over time, this notion will hopefully embed itself within the state structure.

Figure 2—The NPT as a Link



The nonproliferation regime has, because of the norms made law by the NPT, been directly connected to a separate regime—the nuclear disarmament regime. The relevant notion is that nuclear weapon states will engage not only in nonproliferation, but also—as the NPT states—"in the process leading to the total elimination of their nuclear weapons."[13] These two regimes have become tightly tied together, and because of this, achieving effective nuclear nonproliferation without disarmament is almost impossible, as will be demonstrated multiple times throughout this analysis.

The nuclear disarmament regime contains a number of disarmament measures, especially between the United States and Russia, including the SALT and START treaties, SORT, the Cooperative Threat Reduction Program, and the embryonic and multilateral Comprehensive Test Ban Treaty (CTBT). This regime is still in the declaratory stages because although the United States and Russia have made initial efforts to verify bilateral disarmament, inspections have followed the dismantlement of an inadequate number of weapons to reduce the threat the countries pose to each other. Besides this, little has been pursued in relation to multilateral disarmament, and many states are actively seeking nuclear capabilities because they do not agree with the disarmament norm. Indeed, this regime has never made it far out of the declaratory

[13] U.S. Department of State, "Treaty on the Non-Proliferation of Nuclear Weapons," Art. VI, 1 July 1968, TIAS no. 6839, *United States Treaties and Other International Agreements*, vol. 21, pt. 1, 490.

stage; it has been evident from the beginning of arms control treaties that most states do not truly wish to completely disarm their nuclear capabilities.[14]

The taxonomy for state compliance in this regime can be classified as nuclear armament (no change)→ denial of such→ tactical concessions (some agreement that armament is wrong)→ prescriptive status (some disarmament)→ rule-consistent behavior (complete disarmament). North Korea (DPRK) is in the "denial" stage—if A.Q. Khan is correct, it has a few nuclear weapons,[15] but Kim's government will not admit to it at this time. DPRK may reach the tactical concessions stage in the current talks, and may even begin to rhetorically support the norm or start disarmament (putting North Korea in the prescriptive status stage) within the next few years. The United States is at the prescriptive status stage—it decries the nuclear armament of others, but the Bush Administration would like to resume nuclear testing and create a new class of nuclear weapons ("mini nukes"). Only with a change in its decision calculus will the United States begin to exhibit rule-consistent behavior.

The Chemical and Biological Weapons Regimes: According to the Director General of the OPCW—Rogelio Pfirter—"the verification regime set out in the [Chemical Weapons] Convention is the most complex and ambitious in the history of multilateral disarmament."[16] This is accurate; 167 states have renounced the production and use of chemical weapons through the Chemical Weapons Convention and—more importantly—it is unique because it applies no caveats for haves and have-nots, as does the Nonproliferation Treaty. Further, it is ambitious because of its universality in mandate—no chemical weapons of certain types, period. It is also unique because it has an enforcement mechanism—the OPCW—which is clearly engaged in not

[14] For more on this, see Avis Bohlen, "The Rise and Fall of Arms Control," *Survival* 45, no. 3 (Autumn 2003): 7-34.
[15] See David E. Sanger, "Pakistani Tells of North Korean Nuclear Devices," *New York Times* (13 April 2003): A1.
[16] Organization for the Prohibition of Chemical Weapons, "OPCW Director-General, Ambassador Rogelio Pfirter, Addresses the First Committee of the UN General Assembly" (11 October 2004), at <http://www.opcw.org/html/global/press_releases/2k4/PR48_2004prt.html>, accessed 10/18/04.

only the public but also the private sector. The OPCW can recommend sanctions against violators or can bring an issue to the Security Council if more robust enforcement measures are needed. Further, it can restrict CWC-related rights like voting privileges.[17]

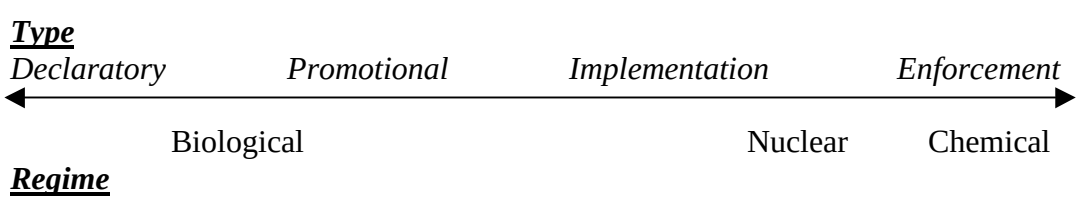
The OPCW has been effective in monitoring compliance; because of this effectiveness, this regime differs from the nuclear nonproliferation regime and falls close to the enforcement category. Although some states—the United States and Russia in particular—are having difficulty destroying their chemical weapons stockpiles as quickly as they originally planned, there is no evidence to indicate that this is because they do not believe destruction is a worthy goal or that it should be ultimately pursued. Almost all states that have signed the CWC have so far exhibited rule-consistent behavior. This is not to say the chemical weapons regime is perfect—it contains flaws that must be addressed—but it is clearly the strongest of the regimes noted in this analysis.

The regime against proliferation of biological weapons falls on the opposite end of the spectrum. The Biological Weapons Convention is weak and unenforceable, and states disagree about how to strengthen it. States submit few reports, and although parties can complain to the Security Council about others' noncompliance with the BWC, to date this has never happened.[18] This lack of accountability is somewhat strange, considering that most countries fall within the higher categories of regime compliance. The United States destroyed its biological weapons stockpile years ago, showing rule-consistent behavior. If Russia still holds biological weapons, as many assume that it does, then it probably falls somewhere between the tactical concessions

[17] Arms Control Association, "The Chemical Weapons Convention (CWC) at a Glance," *Arms Control Today* (September 2004), at <http://www.armscontrol.org/factsheets/cwcglance.asp?print>, accessed 1/4/05.
[18] Seth Brugger and Kerry Boyd, "Briefing Paper on the Status of Biological Weapons Nonproliferation," *Arms Control Today* (May 2003), at <http://www.armscontrol.org/factsheets/bwissuebrief.asp?print>, accessed 1/4/05.

and prescriptive status stages. Many measures can be taken to strengthen this regime, and it truly has the potential to progress the farthest of any of the three that will be examined in this analysis.

Where WMD Nonproliferation Regimes Fall (Figure 3)



Understanding the regime concept is important in order to grasp what must happen to promote the norms surrounding nonproliferation. Eventually for nonproliferation regimes to succeed, most states will need to exhibit rule-consistent behavior since a few cheaters can often spoil success. The purpose of this analysis is to examine what actions can be taken by the international community to foster the success of these regimes.

THE THREAT

I. Nuclear

This survey will not focus heavily on the traditional Cold War-style threat posed between nuclear adversaries such as Russia and the United States. This is not to downplay the destructive capabilities of the thousands of warheads that nuclear adversaries have pointed at each other. But most readers are acquainted with this threat, and it need not be elaborated on here. Instead, this thesis will focus on contemporary problems presented by nuclear materials and weapons, particularly if they are proliferated to rogue states or nonstate actors.

With growing demand for nuclear materials, it is becoming increasingly difficult to control the spread of atomic technology. In testimony given to the U.S. Senate Select Committee on Intelligence in 2003, former CIA Director George Tenet and Defense Intelligence Agency (DIA) Director Lowell Jacoby announced a disconcerting evaluation of this demand for nuclear

know-how. Tenet noted that the nonproliferation consensus is facing "continued weakening," that "the desire for nuclear weapons is on the upsurge," and that an increasing number of nuclear importers are beginning to sell radioactive material to other states, what Jacoby labeled "secondary proliferation."[19]

Regarding nonstate actors, Tenet specifically said that al-Qaeda "seeks chemical, biological, radiological, and nuclear weapons."[20] This is supported by findings in the *9/11 Commission Report* as well as a 2001 declaration by European sources that a Ukrainian-Israeli transnational criminal—Semyon Mogilevich—had been approached by al-Qaeda operatives attempting to procure nuclear material.[21]

Lyudmila Zaitseva and Kevin Hand also observed an attempt by al-Qaeda to procure nuclear material from Jose Padilla, a Chicago criminal arrested in 2002 for having links to the terror group:

> Padilla had met with Abu Zubaydah, bin Laden's operations chief, in Pakistan and proposed the construction of a nuclear bomb. Zubaydah reportedly recommended that Padilla return to the United States and acquire nuclear waste for use in a conventional bomb that would contaminate an area upon detonation. Luckily, U.S. intelligence intercepted Padilla before he could make any progress with this plan. This case, however, clearly demonstrates al Qaeda's interest in acquiring radioactive sources for terrorist attacks.[22]

Tenet supported this assessment by also mentioning al-Qaeda's attempts to "produce or purchase a radiological dispersal device."[23]

With respect to states, Tenet noted that Pyongyang possessed a missile capable of striking the United States (the Taepo Dong-II), although it has not been successfully tested.[24] Jacoby

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[19] Quotes and paraphrase from Paul Kerr, "Intelligence Chiefs Paint Grim Picture of Proliferation," *Arms Control Today* (March 2003): 19, 23.
[20] Quoted in Ibid., 19.
[21] Lyudmila Zaitseva and Kevin Hand, "Nuclear Smuggling Chains: Suppliers, Intermediaries, and End-Users," *American Behavioral Scientist* 46, no. 6 (February 2003): 831.
[22] Ibid., 837.
[23] Quoted in Kerr, "Intelligence Chiefs," 19.

testified that U.S. intelligence believes Iran is attempting to use its civilian nuclear program to establish an indigenous capability to produce nuclear weapons, an argument that has gained more salience throughout the international community over the last year.[25] The debate over Iran is still being played out, and Iran seems to be engaged in a complex game of deception and admission with the IAEA concerning its nuclear program.

In sum, Tenet surmised that the United States is entering a "new world of proliferation," and that the "'domino theory' of the 21st century may well be nuclear." Jacoby noted bleakly that "some 25 countries possess or are actively pursuing WMD or missile programs."[26] Whether these assessments are accurate or overstated is arguable, but the fact that they exist should give us pause to consider that a threat is possible.

"Loose nukes" in the former Soviet Union and elsewhere also pose a serious obstacle to nonproliferation efforts. As Curt Weldon and Chet Edwards—both members of the U.S. House of Representatives—noted, a 2003 "Department of Energy estimate put the amount of Russian weapons-usable nuclear materials at more than 1,500 tons. That is enough for more than 100,000 nuclear weapons."[27] Unfortunately, a large amount of that material is unsecured, and Russia is unable to account fully for its inventory of nuclear weapons and material.[28] We know that some has been stolen. For example, in 1992 Leonid Smirnov, a technician at a Russian materials production plant, stole 1.5 kg of highly enriched uranium (HEU) in small increments.

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[24] A missile test was attempted, but only two of the three stages fired correctly. The fact that only two stages burned successfully is still problematic, however, because their thrust was enough to send the missile well over Japan, proving that North Korea had the capability to threaten that country.
[25] Quoted in Kerr, "Intelligence Chiefs," 23.
[26] Ibid.
[27] Curt Weldon and Chet Edwards, "The Post-Hussein Era: America, Russia, Terrorism, and Weapons of Mass Destruction," *Arms Control Today* (June 2003): 16, noting (n. 2) the General Accounting Office Report, "Weapons of Mass Destruction: Additional Russian Cooperation Needed to Facilitate U.S. Efforts to Improve Security at Russian Sites," GAO-03-482 (March 2003), 80; and Matthew Bunn, Anthony Wier, and John P. Holdren, "Controlling Nuclear Warheads and Materials: A Report Card and Action Plan," (Project on Managing the Atom, Belfer Center for Science and International Affairs, John F. Kennedy School of Government, Harvard University 2003), 13, n. 9 and accompanying text, available at <http://www.nti.org/e_research/cnwm/index.asp>, not accessed.
[28] Weldon and Edwards, "The Post-Hussein Era," 19.

Shortly thereafter, Russian security agents found that over 300 kg of low-enriched uranium (LEU)[29] was missing from the Chepetsk Mechanical Plant in Glazov, apparently stolen by employees. Other examples include workers smuggling uranium out of plants in shopping bags filled with apples or in working gloves.[30] Possible suppliers include poorly paid or disgruntled civilian personnel, military personnel, and guards.[31] And although the West has taken steps to secure this material, as Matthew Bunn noted in 2003,

> [t]he world is, in effect, relying for its security on whatever security upgrades for the remaining material and warheads Russia has been able to put in place on its own. The amount of material not yet equipped with cooperative security upgrades is enough for tens of thousands of nuclear weapons—if even one tenth of one percent of it should go missing, the world could be faced with a catastrophe beyond measure.[32]

II. Biological

The threat from biological weapons is just as serious as that from nuclear weapons, and in many ways is more daunting. In illustration, with the explosion of a nuclear weapon or a radiological device, the destruction from the blast is immediate. If a nuclear weapon is used, the radioactive material can usually be traceable to a given location of origin. Negative effects on a populace would spread with the radiation, but would diminish as one traveled further from ground zero. With a biological weapon, none of these conditions hold. The damage may not be detected for a week or more, after people get infected and sick. Many biological strains are untraceable to a given lab, as was evidenced by the strain of anthrax used in the 2001 attacks. If the agent is contagious, like smallpox, those at ground zero are not only affected, but the sickness from an attack can spread through an entire populace before it is contained.

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[29] Not good for a nuclear bomb, but usable for a radiological device.
[30] Zaitseva and Hand, "Nuclear Smuggling Chains," 823-4.
[31] It seems that outsiders are rarely involved in stealing nuclear material. See Ibid., 821-27.
[32] Matthew Bunn, *Preventing Nuclear Terrorism: A Progress Update* (Washington, D.C.: Nuclear Threat Initiative and the Project on Managing the Atom, Harvard University, 22 October 2003), at <http://bcsia.ksg.harvard.edu/publication.cfm?ctype=book&item_id=290>, accessed 3/20/04.

These characteristics of bioweapons make them less useful for a state wishing to have a first- or second-strike capability, and this is one reason states prefer nuclear weapons. But nonstate actors would benefit from biological weapons precisely because of these characteristics—lag time between infection and diagnosis allows perpetrators to escape, devastation is indiscriminate, and the strains can be untraceable to the place of origin.[33]

Some biological weapons are also highly deadly. As the Canadian Security Intelligence Service notes, "type-A botulinal toxin, or BTX, with a mean lethal dose estimated to be as low as a few tenths of a microgram," is considered "the most lethal substance known." One-half ounce, properly dispersed, could kill everyone in North America, and eight ounces could kill all human and animal life on Earth.[34] For these reasons the United States is putting efforts into developing biological "sniffers" through Operation BioWatch to detect an attack, and is also stockpiling vaccines and antibiotics through Operation BioShield. Nevertheless, if an outbreak occurred, it could be potentially devastating on a population.

Further, the number of states that possess biological weapons is much greater than those that hold nuclear weapons, and many of these are not friendly to the West. For example, Cuba has a limited biological research effort; Iran has likely produced and weaponized biological agents; North Korea has an active program and may have weapons ready for use; and Syria may be capable of producing a small amount of biological material through a weapons program in its

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[33] Canadian Security Intelligence Service [hereafter noted as CSIS], "The Threat of Chemical/Biological Terrorism," *Commentary* no. 60 (August 1995), at <http://www.csis-scrs.gc.ca/eng/comment/com60_e.html>, accessed 11/18/04.

[34] Robert H. Kupperman and David M. Smith, "Coping with Biological Terrorism," in Brad Roberts, ed., *Biological Weapons: Weapons of the Future?* (Washington, D.C.: Center for Strategic and International Studies, 1993), 35-46; Neil C. Livingstone, *The War Against Terrorism* (Lexington, MA: Lexington Books, 1982); Wayman C. Mullins, "An Overview and Analysis of Nuclear, Biological, and Chemical Terrorism: The Weapons, Strategies, and Solutions to a Growing Problem," *American Journal of Criminal Justice* 16, no. 2 (1992): 95-119; all of the above noted in CSIS, "Threat."

early stages.[35] This problem is compounded by the fact that the BW nonproliferation regime is still in its formative stages, and states probably do not feel the same stigma associated with biological weapons as that associated with clandestinely acquired nuclear weapons.

The problems posed by biological materials in the former Soviet Union mirror those caused by nuclear components. Russia is still thought to hold a formidable bioweapons capability, and many of its scientists could pose a proliferation risk. At the time of the Soviet Union's collapse, its bioweapon facilities employed approximately 60-65,000 people. Five to ten thousand of those have weapons-relevant skills, and approximately one-hundred could build a weapon from start to finish if provided with the materials.[36] Unfortunately, because many of these former scientists receive only a fraction of their previous salary, the temptation to sell deadly pathogens on the illicit market surely exists, as it does with other WMD from the former Soviet Union.[37] It is important also to remember that the problem does not end in Russia. With the collapse of the USSR, Kazakhstan, Uzbekistan, and Georgia also received pathogen collections.[38]

In addition to the threat posed by ex-Soviet scientists, no evidence exists that the Russian military has demobilized its biological weapons capabilities. The Trilateral Process with Russia, the United States, and Great Britain allowed inspection of Russian and U.S./British nonmilitary facilities, but the initiative broke down before Russian military sites were inspected.[39] Nobody

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[35] Arms Control Association, "Chemical and Biological Weapons Proliferation at a Glance," *Arms Control Today* (September 2002), at <http://www.armscontrol.org/factsheets/cbwprolif.asp?print>, accessed 1/4/05.
[36] Kenneth N. Luongo et al., "Building a Forward Line of Defense: Securing Former Soviet Biological Weapons," *Arms Control Today* (July/August 2004), at <http://www.armscontrol.org/act/2004_07-08/Luongo.asp?print>, accessed 10/18/04.
[37] Jonathan B. Tucker, "Preventing the Misuse of Pathogens: The Need for Global Biosecurity Standards," *Arms Control Today* (June 2003), at <http://www.armscontrol.org/act/2003_06/tucker.asp?print>, accessed 10/18/04.
[38] Ibid.
[39] Brugger and Boyd, "Briefing Paper."

has been granted access to Russia's Defense Ministry-controlled facilities, and as a result the U.S. Congress has limited expenditure on threat reduction funds allocated for them.[40]

Nonstate actors are also pursuing biological weapons. As four bioweapon specialists—Kenneth Luongo, Derek Averre, Raphael Della Ratta, and Maurizio Martellini—note, "The anthrax attack on the U.S. Congress [and media] … and the unearthing of documents detailing pathogen production processes in al Qaeda hideouts indicate that terrorists are willing to pursue both biological weapons development and use."[41] A terrorist with knowledge of microbiology could isolate pathogens from natural sources, although the chances of this being effective in creating a usable weapon are less than stealing more virulent material. If a terrorist organization desired to steal a biological specimen, it could do so from, as Jonathan Tucker—an academic at the United States Institute of Peace—notes, "a research facility, a clinical laboratory, a commercial supplier, or a state-owned culture collection."[42]

Incidents of attempted theft and sale have occurred worldwide. In November 2002, police arrested a man attempting to steal pathogen samples from the Scientific Center for Quarantine and Zoonotic Diseases in Kazakhstan. Further, although South Africa's program was dismantled in 2003, former scientists kept samples of virulent strains—including genetically engineered varieties—which they attempted to sell.[43] This is disturbing because—as with a radiological device—terrorists would not need much material in order to cause disastrous effects. As Colin Powell demonstrated in his 2003 speech to the United Nations Security Council, even a small vial filled with something as deadly as anthrax could kill many people.[44]

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[40] Luongo et al., "Building a Forward Line."
[41] Ibid.
[42] Tucker, "Preventing."
[43] Ibid.
[44] For a transcript of Powell's presentation, see "U.S. Secretary of State Colin Powell Addresses the UN Security Council," *The White House* (5 February 2003), at <http://www.whitehouse.gov/news/releases/2003/02/20030205-1.html>, accessed 1/5/05.

III. Chemical

As noted earlier, chemical weapons do not present a threat on the magnitude of biological and nuclear weapons and, if used, would create more terror than mass destruction. This is not to say, however, that chemical weapons are not dangerous. A small quantity of sarin, if inhaled, can kill someone in a single breath. VX is even more toxic—a droplet the size of a pinhead is sufficient to kill a human.[45] Further, the psychological and economic effects of an attack can be devastating, as evidenced by the mass disruption that the Tokyo subway attacks caused in 1995.

The real threat from chemical weapons is posed by the relative ease of manufacturing them from widely available chemicals. As Amy E. Smithson notes in relation to poison gas production, simple chemicals can be used in making deadly weapons: "Of particular relevance to poison gas production are the chemicals and equipment used to make pesticides, fertilizers, and pharmaceuticals. These commodities can be purchased on the open market, including by sub-national actors …."[46] For example, commercial uses of agents utilized to make sarin include flame retardants, gas additives, plasticizers, paint solvents, and antiseptics. Chemicals that could be employed to make VX include certain insecticides and lubricant oil additives. This is not to assert that manufacturing weapons from precursor chemicals is simple, but experts agree that it would be possible for someone with a graduate knowledge of chemistry to make some of the agents by using rudimentary equipment. Further, many designs for early (WWI-era) chemical weapons are widely available in libraries and on the Internet.[47]

Terrorists have used home-made chemical weapons before (in the Aum Shinrikyo attack), and it is possible they will use them again. Evidence indicates that Iraqi insurgents have

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[45] CSIS, "Threat."
[46] Amy E. Smithson, "Ataxia: The Chemical and Biological Terrorism Threat and the US Response," *The Henry L. Stimpson Center* (2004), 30, at <http://www.stimson.org/cbw/pdf/atxchapter2.pdf>, accessed 1/5/04.
[47] Ibid., 31-33.

attempted to make chemical or biological weapons for use against American troops. For example, in mid-2004, CIA personnel associated with Charles Duelfer's Iraq Survey Group discovered two rogue Iraqi scientists attempting to make chemical weapons, who were working for Abu Musab al-Zarqawi's insurgents. According to Duelfer's report, their effort began in late 2003, and although they had not succeeded in producing effective chemical weapons, "with time and experience it is plausible" that they could have weaponized toxic chemicals. They were particularly interested in making tabun with the pesticide malathion; they had also acquired nitrogen mustard precursors from government supplies and chemical shops. They attempted to make tabun and mustard gas, and successfully produced ricin cake and sodium acetate as well as napalm.[48] The CIA was fortunate to intercept these scientists before they succeeded in their ventures, but it can only be a question of "how long" until the next attempt occurs.

State possessors can also pose a threat. For example, a number of unfriendly states have acquired chemical weapons, including Iran, North Korea, and Syria.[49] Iran and Iraq both used chemical weapons in the Iran-Iraq War, and many states have multiple delivery vehicles for chemical weapons.[50] Further, as with biological and nuclear weapons, scientists in the former Soviet Union are knowledgeable in production of chemical weapons and the Russian destruction of chemical stockpiles is proceeding slowly, as will be discussed below.

The ultimate magnitude of the threat caused by nuclear, biological, and chemical weapons is fathomable when we consider the paradigm within which they would be used. Whereas traditionally, WMD have been procured as levers for deterrence, terrorists or "rogue"

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[48] Bob Drogin, "Iraqi Insurgents Seek Chemical Weapons; Likelihood of Success Grew with U.S. Occupation, Report Says," *Los Angeles Times* (10 October 2004), at <http://www.sfgate.com/cgibin/article.cgi?file= /c/a/2004/10/10/ MNG8H96T2N1.DTL>, accessed 1/5/05; see also Central Intelligence Agency, "Comprehensive Report of the Special Advisor to the DCI on Iraq's WMD" (30 September 2004), at <http://www.cia.gov/cia/reports/iraq_wmd_ 2004/>, accessed 1/5/05.
[49] Arms Control Association, "CBW Proliferation at a Glance."
[50] Ibid.

states do not see them as such.[51] President Bush adequately summarized the threat—at least from terrorists—in his 2004 speech to the U.S. National Defense University: "…[I]n the hands of terrorists, weapons of mass destruction would be a first resort—the preferred means to further their ideology of suicide and random murder."[52]

WEAKNESSES OF THE NONPROLIFERATION REGIMES

I. Nuclear

As argued earlier, the nuclear nonproliferation regime is at the implementation stage thanks to the IAEA and other international nonproliferation measures, but it has begun to unravel since the early 1990s. Weaknesses hamper the regime from reaching the enforcement stage and may eventually spell its disintegration. Mohamed ElBaradei has noted that ultimately, any flaws in the regime make "the margin of security under [it] … too slim for comfort."[53] The regime's key weaknesses revolve on five points: (a) international efforts to hide nuclear activities, (b) inability to absolutely control nuclear fuel production and (c) export, (d) the existence of non-signatories to the NPT, and (e) the attractiveness of nuclear weapons.

Deception and the Additional Protocol: ElBaradei stated that the key obstacle to the IAEA's work of verifying compliance with the NPT is national efforts to hide activities.[54] The Agency's mandate and authority—as currently constituted—are "increasingly inadequate to

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[51] Opponents of the argument that rogue states do not act rationally forget that during the Cuban Missile Crisis, Fidel Castro recommended that Khrushchev go ahead with a missile strike, even though it would assuredly bring the destruction of Cuba. There is no evidence to indicate that he was bluffing. And although Castro may have been acting "rationally" according to his own decision calculus, we can only be grateful that cooler heads prevailed. See Keith B. Payne, *The Fallacies of Cold War Deterrence and a New Direction* (Lexington: The University Press of Kentucky, 2001), especially pages 50-2.

[52] George W. Bush, "Remarks by the President on Weapons of Mass Destruction Proliferation," (Speech given at Fort Lesley J. McNair—National Defense University, Washington, D.C., 11 February 2004), *The White House*, at <http://www.whitehouse.gov/news/releases/2004/02/print/20040211-4.html>, accessed 2/12/04.

[53] Mohamed ElBaradei, "Towards a Safer World," *The Economist* 369, no. 8346 (18 October 2003), available from Gale Group, accessed 3/20/04.

[54] "Interview with Dr. Mohamed ElBaradei," *Fletcher Forum* 28, no. 1 (Winter 2004): 30.

prevent the spread of weapons technology."[55] In 1991, after the Persian Gulf War, the IAEA learned that Iraq had a clandestine nuclear program which had not before been discovered because, under the rules of the NPT at that time, inspections only occurred at declared nuclear facilities. If a state chose not to admit the existence of a clandestine facility, the IAEA had no authority to inspect anywhere except at declared sites. Since 1991, undeclared nuclear programs have been discovered in Iraq, North Korea (when it was a signatory), Iran, and Libya.[56]

The discovery of the Iraqi program spurred an international impetus to strengthen the regime by drafting what has become known as the "Additional Protocol"—designed to change the IAEA "from a quantitative system focused on accounting for known quantities of materials and monitoring declared activities to a qualitative system aimed at gathering a comprehensive picture of a state's nuclear and nuclear-related activities, including all nuclear-related exports and imports."[57]

The Additional Protocol is a voluntary measure that embodies four key changes within the nonproliferation regime: (a) expanding the amount and type of information states provide to the IAEA; (b) increasing the number and types of facilities the IAEA will be able to monitor; (c) streamlining the visa process for inspectors so they have a strengthened ability to conduct short-notice inspections; and (d) giving the IAEA permission to use environmental sampling at declared and undeclared sites, and over a wide area rather than at specific facilities.[58] In short, if the Additional Protocol is enacted, it will allow the IAEA to go anywhere it wishes in a cooperating nation, will eclipse old methods of simply accounting for declared materials, will let

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[55] Brian Whitmore, "Weaknesses Seen in Nonproliferation Treaty," *Daily Camera* (10 February 2004), at <http://www.dailycamera.com/bdc/nation_world_news/article/0,1713,BDC_2420_2643135,00.html>, accessed 3/24/04.
[56] See George Bunn, "The Nuclear Nonproliferation Treaty: History and Current Problems," *Arms Control Today* (December 2003): 4.
[57] Arms Control Association, "The 1997 IAEA Additional Protocol At a Glance" (January 2004), at <http://www.armscontrol.org/factsheets/IAEAProtocol.asp?print>, accessed 3/20/04.
[58] Ibid.

the IAEA examine anywhere it desires, on short notice, and will allow it to use environmental sampling.[59] The key weakness of the Additional Protocol is that—to date—only 38 nations of the 188 that have ratified the Nonproliferation Treaty have also ratified the Protocol; until it is ratified, it cannot be enforced.[60]

Controlling Fuel Cycles: A severe shortcoming of the nuclear nonproliferation regime is a state's ability to indigenously enrich nuclear material—what is known as creating a "closed" fuel cycle—as long as that enrichment is declared to the IAEA. Neither uranium nor plutonium enrichment is proscribed under the NPT. ElBaradei has noted that under the current regime, "there is nothing illicit in a non-nuclear-weapon state having enrichment or reprocessing technology, or possessing weapon-grade nuclear material."[61]

This factor makes it possible for the world to include not only nuclear weapon and non-nuclear weapon states, but also "nascent" nuclear weapon states[62]—"nascent" meaning that a state has the know-how and materials to make a nuclear weapon, but has not done so. The problems this creates are twofold: (a) A nascent nuclear weapon state could build a weapon capacity in an extremely short period of time; and (b) a nascent nuclear weapon state could export enriched material to other actors which may need it to build a weapon.

Uncontrolled Exports: The crux of the nonproliferation regime is based on the export of nuclear materials—it was established so that five states would have nuclear weapons (China, Russia, the United States, Great Britain, and France) and all other states would renounce nuclear weapons capabilities if the five weapons-possessing states agreed to help the others acquire

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[59] William J. Broad, "Sleuths Patrol Nations for Nuclear Mischief," *New York Times* (30 December 2003): F1.
[60] Ibid.; and The Acronym Institute for Disarmament Diplomacy, "The Nuclear Non-Proliferation Treaty: List of States that Have Signed and Ratified the Treaty, September 2004" (2004), at <http://www.acronym.org.uk/npt/parties.htm>, accessed 1/6/05.
[61] ElBaradei, "Towards a Safer World."
[62] Graham Allison, "How to Stop Nuclear Terror," *Foreign Affairs* 83, no. 1 (January/February 2004): 64-74.

technology for peaceful nuclear programs. These five countries have partnered with many of the non-nuclear weapon states to create what is known as the Nuclear Suppliers Group (NSG)—a group of 40 nations with material that can be used for both peaceful and weapons programs that "voluntarily [agree] to coordinate their export controls governing transfers of civilian nuclear material and nuclear-related equipment and technology to non-nuclear weapon states."[63] In an attempt to control the export of materials that could be used to make nuclear weapons, this group establishes restrictions on what can and cannot be exported. NSG restrictions apply to all states, not simply those in the Nonproliferation Treaty; also, NSG members are supposed to report their export denials to one another in order to coordinate policy.[64]

The first problem with the NSG structure is that several countries with nuclear know-how and materials exist outside of the NSG, including India, Israel, Pakistan, and North Korea.[65] These countries have no multilateral agreement to carefully restrict dangerous exports; indeed, as Pakistan has recently shown, some states are actively proliferating in the exact materials the NSG is trying to contain. This setup acts like a leak at the bottom of a bathtub—although the plug (NSG) holds in most of the water, if there is even a small leak, all of the water will eventually drain from the tub.

A second problem with the NSG structure is that because of the voluntary nature of the regime, state member compliance is not enforced—members may export if they wish. For example, "Russia transferred nuclear fuel to India in January 2001 even though 32 of 34 NSG members earlier declared that the shipment would contradict Russia's NSG commitments."[66] In

[63] Arms Control Association, "The Nuclear Suppliers Group (NSG) at a Glance" (February 2004), at <http://www.armscontrol.org/factsheets/NSG.asp?print>, accessed 3/20/04.
[64] Ibid.
[65] Ibid.
[66] Ibid.

order for the NSG to work perfectly, a structure must be enacted whereby all supplier states are members and so that nobody can export materials against the general wishes of the others.

Non-Signatories to the NPT: As noted above, the Nonproliferation Treaty forbade non-nuclear weapon signatories to develop nuclear weapons, but the Treaty clearly does not apply to non-signatories. Therefore, non-signatories can produce weapons legally. This loophole has allowed India, Pakistan, Israel, and possibly North Korea (now that it has withdrawn from the NPT) to develop nuclear weapons without concern for treaty constraints.[67]

Unless these states accept willingly or by force the nuclear nonproliferation regime, their existence poses serious problems for it because the norm of nonproliferation cannot endure unless states eventually stop battling it. ElBaradei feels that their existence may ultimately spell the end of the regime. He noted to *Arms Control Today* that "the NPT can survive—has survived—without them. But … ultimately … the nonproliferation regime will not survive without them. The NPT is a part of the regime, and if we talk about the regime—global, universal, enduring—then it will not survive without [them]."[68] Whether the regime would absolutely collapse—as ElBaradei advocates—without these countries is ultimately unknown; it may simply weaken from being an implementation regime to a less-involved state of activity. Nevertheless, uncooperative countries pose instability for the nonproliferation regime as a whole.

Desire for the Technology: Because the nuclear nonproliferation regime is connected to the nuclear disarmament regime through the Nonproliferation Treaty, any unraveling of the disarmament norm will eventually undermine the NPT and then, slowly, the nonproliferation regime itself. This norm has never rested on firm ground—nuclear weapon states generally do not abandon nuclear weapons when threats from other nuclear powers exist, and non-nuclear

[67] ElBaradei, "Towards a Safer World."
[68] Arms Control Association, "Curbing Nuclear Proliferation," 6.

weapon states desire nuclear weapons in order to deter threats from any state stronger than themselves. As ElBaradei has noted, "The very existence of nuclear weapons gives rise to the pursuit of them. They are seen as a source of global influence, and are valued for their perceived deterrent effects. And as long as some countries possess them (or are protected by them in alliances), and others do not, this asymmetry breeds chronic insecurity."[69]

A case in point can be made within the Middle East and South Asia, where the nuclear situation may be unsustainable.[70] In the Middle East, more countries have refused to sign treaties banning WMD than have states in any other region. In South Asia, neither Pakistan nor India is a signatory to the NPT, and both have nuclear weapon capabilities. Israel's nuclear deterrent fuels desire by the Islamic world to obtain a counter-deterrent, but Israel will not relinquish its weapons until regional Muslim countries are considered non-threats.[71] In order to promote nuclear disarmament in the region, Israel must abandon its nuclear arsenal; for it to do so, Iran and Pakistan will have to give up their own nuclear capabilities. For Pakistan to disarm, India must do so, which means that China cannot be a regional threat to India; and for China to give up its arsenal, the United States and Russia will have to abandon theirs. Russia's relinquishment of weapons will be contingent not only on U.S. disarmament, but also on British and French.[72] The disarmament process can only be fueled by a chain reaction starting at the states with the most destructive capabilities. This process can be applied to any region, but eventually all states must verifiably disarm in order for a single state to feel secure.

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[69] ElBaradei, "Towards a Safer World."
[70] Mohamed ElBaradei and Sir Joseph Rotblat, "Time is Ripe to Act on Middle East Weapons," *Financial Times* (3 February 2004), available at <http://www.iaea.org/NewsCenter/Statements/2004/ebFT20040203.html>, accessed 3/20/04.
[71] Ibid.; and H.E. Daniel Ayalon, Israeli Ambassador to the United States of America, speech at the Fletcher School of Law and Diplomacy, Medford, MA, 21 April 2004, notes in possession of the author.
[72] For a different version of this, see Adil Najam, "Get Rid of All Nuclear Arms," *USA Today* (19 February 2004), at <http://www.usatoday.com/news/opinion/editorials/2004-02-18-oppose_x.htm>, accessed 4/23/04.

This problem is further exacerbated by the United States' and Russia's development of essentially new nuclear weapons. In illustration, in the case of America, critics have argued that as long as the United States feels the need to retain its current arsenal and develop more weapons, nuclear capabilities will be desired by others. They assert that nonproliferation initiatives sponsored by the United States will fall flat as long as America pursues a 'do-as-I-say, not-as-I-do' policy.[73] After Bush's speech at the National Defense University, foreign newspapers spouted criticism that the "hypocrisy in Washington fairly reeks;" and many wondered how the United States will be able to restructure the world order, considering Bush's "contempt for traditional arms control."[74] A Bangalore-based paper articulated the harshest diatribe:

> America is incessantly searching for more powerful nuclear weapons such as 'bunker-busters' and more immorally, 'mini-nukes' for integration with conventional weaponry. What right has the American President then to threaten with 'unwelcome consequences' those who copy him and look for whatever weapons they can make or get in the hope of protecting themselves? The non-nuclear states cannot be blamed if they feel cheated by the NPT and now decide to ignore their commitment to the treaty too.[75]

Even the U.S. Congress has shown distaste for the Administration policy, as evidenced by the fact that it denied FY 2005 funding for development of new systems.[76]

The Bush Administration disagrees with the criticism. New nuclear weapons would strengthen America by adding to the American deterrent capability, and bunker busters could theoretically be used against terrorists.[77] Further, speaking of its ability to restart nuclear weapons research, Administration officials stated that they believe new initiatives will not have

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[73] Arms Control Association, "Arms Control Experts Comment on Bush Nonproliferation Proposals."
[74] U.S. Department of State (Office of Research, Issue Focus, Foreign Media Reaction), "February 23, 2004. Bush Non-Proliferation Speech: International Action is 'Badly Needed'" (23 February 2004), at <http://www.globalsecurity.org/wmd/library/news/use/2004/wwwh40223.htm>, accessed 3/20/04.
[75] Ibid.
[76] Wade Boese, "Congress Axes Funding for New Nukes," *Arms Control Today* (December 2004), at <http://www.armscontrol.org/act/2004_12/NewNukes.asp?print>, accessed 12/30/04.
[77] Arms Control Association, "The Bush Administration's Views on the Future of Nuclear Weapons: An Interview with NNSA Administrator Linton Brooks," *Arms Control Today* (January/February 2004): 3-8.

"any practical impact on the pursuit of nuclear weapons by proliferating states."[78] This may be true—states desiring to proliferate or receive nuclear technology may do so regardless of U.S. action. But it is necessary to take the logic a step further. We must ask why receivers desire the technology and what can be done to change their decision calculus. The desire exists because some states feel threatened in a world where others own weapons of mass destruction. Their decision calculus will change when this insecurity is ameliorated, and that will only occur either with disarmament or once they own a deterrent. Therefore, continuing development may not make anything worse, but it will also not make anything better for nonproliferation. Finally, the reestablishment of research may not impact the desires of those without weapons, but it does influence those that currently possess weapons. Shortly after U.S. officials made the above comment, Vladimir Putin indicated that Russia would resume its own development programs and create a new class of nuclear weapons that would surpass all contemporary capabilities.[79]

Much of the criticism against America is focused around the proposal to develop new low-yield nuclear weapons. The Bush Administration notes that it is not, in actuality, building anything new but simply wishes to assess the feasibility of doing so. Critics ask why this is necessary, noting that America already possesses low-yield nuclear weapons. Currently, more than one-third of the nuclear stockpile (some 4,220 warheads) is made up of low-yield weapons. They ask why it is necessary to assess the feasibility of developing something America already possesses. U.S. officials reply that that the reason is to make current capabilities more credible and discriminate against future threats, meaning that current weapons need to be upgraded.[80]

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[78] As quoted in Wade Boese, "U.S. Defends New Nuclear Weapons Research," *Arms Control Today* (May 2004), at <http://www.armscontrol.org/act/2004_05/NuclearResearch.asp?print>, accessed 10/18/04.
[79] See Steven Lee Myers, "New Nuclear Weapon to Surpass Others, Putin Says," *New York Times* (17 November 2004), at http://www.nytimes.com/2004/11/17/international/europe/17cnd-russ.html?ex=1105074000&en=ed1d60e7f2293917&ei=5070>, accessed 1/5/05; and Boese, "U.S. Defends New Research."
[80] Robert S. Norris and Hans M. Kristensen, "What's Behind Bush's Nuclear Cuts," *Arms Control Today* (October 2004), at <http://www.armscontrol.org/act/2004_10/NRDC.asp?print>, accessed 10/18/04.

This justification is understandable—with technology constantly improving, it is reasonable to want upgrades of old weapons systems. The downside is that other nations feel less secure as a result because they are unsure what the consequences will be for their ability to deter U.S. aggression. Neither the Administration nor its critics will win this debate soon, but in the end, ElBaradei is probably correct—as long as nuclear weapons are wielded by some and seen as desirable by others, complete nonproliferation and disarmament probably cannot occur.

A similar problem has been sparked by the floundering of the Comprehensive Test Ban Treaty. As long as some states reserve the right to test nuclear weapons, others feel the need to do so, and this adds to the security dilemma outlined above. The CTBT is being blocked by twelve states, many of which would probably ratify if the United States did so. The U.S. defense of not acceding to the CTBT is understandable—America's view is that it has no need for testing and will live by the principles of the CTBT, but does not wish to be constrained in the future. Further, it feels the CTBT is unverifiable. Critics argue that as long as America and other key actors do not sign the CTBT, "little international pressure can be brought to bear on India, Pakistan, or North Korea" to keep them from testing.[81]

Concerning verifiability, even though the CTBT has not come into force, an effective International Monitoring System (IMS) has been established in preparation for it to do so. As part of the IMS, engineers have installed monitoring stations, radionuclide technology, hydroacoustic stations, and infrasound systems around the globe.[82] The IMS is functioning and has already documented multiple events. For example, IMS stations registered the two explosions aboard the Russian submarine *Kursk* in 2000. It detected the North Korean rail-car

[81] Rebecca Johnson, "Beyond Article XIV: Strategies to Save the CTBT," *Disarmament Diplomacy* 73 (October-November 2003), at <http://www.acronym.org.uk/dd/dd73/73ctbt.htm>, accessed 4/23/04.
[82] Miles A. Pomper, "Test Ban Infrastructure: A Concrete Reality," *Arms Control Today* (October 2004), at <http://www.armscontrol.org/act/2004_10/CTBT.asp?print>, accessed 10/18/04.

and mountain explosions in 2004, and IMS information was used to prove that the mountain explosion was not a nuclear test. One of these was estimated at 5 tons (T), less than one-third the size of America's smallest nuclear trial (of 18T). Explosions of 100T can be detected anywhere in Europe, Asia, North Africa, and North America; and in land areas of interest, explosions less than 10T can be registered.[83] These successes show that verifiability of the CTBT should not be a concern.

Incidentally, the United States has been used here as an example of a nuclear-weapon possessing state causing problems by attempting to restart research and by not ratifying the CTBT, but the blame for creating instability cannot lie squarely at the feet of America. Russia's and others' continued development of new weapons and many states' unwillingness to ratify the CTBT create equally as many problems as do the United States' actions.

II. Biological

Weaknesses within the biological weapons regime make it even less effective than the nuclear nonproliferation regime, and it has struggled to progress into the promotional stage. The most hampering weakness is the unenforceable Biological Weapons Convention. Other shortcomings, however, include pathogen security vulnerabilities, multiple problems associated with research and development, and entirely new specimens and uses of biological pathogens.

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[83] "Bannergram," *IRIS Newsletter* no. 1 (2000): 27; Stephen I. Schwartz, *Atomic Audit: The Costs and Consequences of U.S. Nuclear Weapons Since 1940* (Washington, D.C.: Brookings Institution Press, 1998), 156-7, n. 117; "NRDC Nuclear Notebook: Known Nuclear Tests Worldwide, 1945-98," *Bulletin of Atomic Scientists* (November/December 1998); "Train Blast Eight Times Bigger than Claimed by North Korea," BBC Monitoring International Reports (15 May 2004); Rob Edwards, "North Korea Blast Not a Nuclear Test," *NewScientist.com* (13 September 2004); Christopher Torchia, "N. Korea Snubs N-test Speculation," *Boston Globe* (14 September 2004); Committee on Technical Issues Related to Ratification of the Comprehensive Nuclear Test Ban Treaty, *Technical Issues Related to the Comprehensive Nuclear Test Ban Treaty* (Washington, D.C., National Academy Press, 2002), 5; all of the above noted in Damien LaVera, "Looking Back: The U.S. Senate Vote on the Comprehensive Test Ban Treaty," *Arms Control Today* (October 2004), notes 3-8, at <http://www.armscontrol.org/act/2004_10/Looking Back_CTBT.asp? print>, accessed 10/18/04.

The Unenforceable BWC: The Biological Weapons Convention is one of the most violated WMD-related treaties. The former Soviet Union retained a robust weapons program after it declared that it was BW-free and evidence indicates that Russia may have kept elements of that program. Iraq violated its commitments before the Persian Gulf War, and other possible violators include North Korea, Iran, and Libya. Some assert that the United States' biodefense research actually violates the Convention; this will addressed later.[84] The BWC is also weak because a number of states which possess biological weapons are non-parties to the Convention, the most worrying being Syria.

In 1986 the States Parties agreed to a number of measures to enhance compliance, including exchanging data on research labs and about abnormal outbreaks of disease; encouraging publication of research results and promoting scientific contact; and declaring legislation relating to the BWC as well as R&D programs and vaccine production facilities. Unfortunately, the endeavors were unsuccessful since most parties failed to submit the given reports.[85]

This led to an attempt to create a binding verification system, and a protocol establishing an inspection mechanism was proposed in 2001 but then rejected by the United States. The enforcement mechanism was envisioned along the lines of the IAEA—it would investigate accusations and inspect facilities declared by member states. For the United States, the essential problems with this system were two-fold. As constituted, the protocol was not intrusive enough to create an effective enforcement mechanism against proliferators or receivers, but instead would spend vast resources ensuring verification of rich Western states' capabilities. Secondly, U.S. officials stated that it would have endangered U.S. security and commercial interests and

[84] Arms Control Association, "The Biological Weapons Convention At a Glance" (February 2004), at <http://www.armscontrol.org/factsheets/bwcataglance.asp>, accessed 1/5/05.
[85] Ibid.

weakened export control bodies.[86] America felt that it had no choice but to veto the resolution. As an alternative, the United States proposed several measures to move forward (which will be discussed below).

Whether the United States' concerns with the protocol were valid is a contentious debate. The most cogent arguments questioning U.S. action can essentially be summed as four points: First, although the protocol may not have been totally effective in stopping proliferation, it would have made it more difficult to proliferate. In Pareto terms, this is a desirable outcome. Second, the protocol would have given the United States a mechanism through which to investigate concerns. Third, the U.S. General Accounting Office reported in 2002 that the protocol would actually have strengthened export controls. Finally, the drafters of the initiative knew of U.S. concerns, and the protocol was crafted with provisions to protect U.S. commercial and biodefense secrets, not hinder them.[87]

Critics assert that an unstated reason America would not agree to such an intrusive mechanism was because it had not only biodefense secrets, but also clandestine biodefense programs which it did not wish to reveal.[88] This may or may not have been the case, but regardless of why America scuttled the process, the BWC is still unenforceable, and although alternatives have been proposed to fill the gaps, few actions have been taken. Until measures can be employed to strengthen the regime, the BWC's unenforceable nature will hinder nonproliferation efforts.

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[86] Arms Control Association, "The BWC at a Glance;" and Brugger and Boyd, "Briefing Paper."
[87] As presented in Brugger and Boyd, "Briefing Paper;" see also for point three Arms Control Association, "BWC Won't Harm Export Controls," *Arms Control Today* (January/February 2003), at <http://www.armscontol.org/act/2003_01-02/briefs_janfeb03.asp?print>, accessed 10/18/04.
[88] Jonathan B. Tucker, "Biological Threat Assessment: Is the Cure Worse Than the Disease?" *Arms Control Today* (October 2004), at <http://www.armscontrol.org/act/2004_10/Tucker.asp?print>, accessed 10/18/2004.

Pathogen Security Vulnerabilities: The threat from biological weapons is augmented because measures to secure biological materials worldwide are not as encompassing as similar measures to secure nuclear resources, especially since some biological pathogens have civilian uses and cannot be controlled like nuclear supplies.[89] For example, university researchers often share microbial samples, and few countries have restrictions on access to infectious agents. The World Federation for Culture Collections has recommended that its members restrict third-party access to pathogens, but two-thirds of the world's culture collections do not belong to the organization.[90]

Before the 2001 anthrax attacks, the United States and other governments were not particularly effective at controlling pathogen movements. Jonathan Tucker gives an example of poor governmental oversight:

> Although it is not possible to measure precisely the level of risk associated with poor security at microbiological laboratories, some recent incidents in the United States and elsewhere have hinted at the magnitude of the problem. A report in May 2002 by the inspector-general of the U.S. Department of Agriculture found that many of the department's 124 research laboratories were vulnerable to theft and could not account accurately for their stocks of animal and plant pathogens. Similarly, investigations at the Pentagon's leading biodefense facility, the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) at Fort Detrick, Maryland, found chronic problems with laboratory security during the 1980s and 1990s, including repeated failures to account for samples of pathogens because of poor internal controls and record keeping.[91]

These problems were probably recognized due to heightened fear of bio-terror following the 2001 attacks, and the United States is slowly making efforts to fix these weaknesses. Many other countries, however, have changed their practices little since 2001.

The main concern that poor oversight engenders is that terrorists could obtain biological materials from a pathogen collection and use the materials to infect or poison a population. Efforts to counter a bioterror attack have focused mainly on the medical and health response

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[89] Tucker, "Preventing."
[90] Ibid.
[91] Ibid.

rather than on prevention. Although a medical response is necessary, the only way to prevent a bioterror attack instigated by nonstate actors is to keep them from obtaining the material in the first place, and this will require enactment of much more stringent measures to secure biological pathogens.[92]

Problems with R&D: The Biological Weapons Convention does not ban programs that are designed for threat assessment and countermeasures.[93] However, some countries, particularly the United States and Russia, are beginning to engage in biodefense research which could impact the regime's stability. On the American side, after the BWC was ratified, U.S. National Security Advisor Brent Scowcroft issued a memorandum detailing which types of biodefense measures the United States would engage in:

> Activities concerned with the protection of human beings, animals, plants, and materiel from the effects of exposure to microbial or other biological agents or toxins, including vulnerability studies and research, development and testing of equipment and devices such as protective masks and clothing, air and water filtration systems, detection, warning and identification devices, and decontamination systems.[94]

Some feel that nothing in this memorandum permitted development of new pathogens or weaponization systems as part of threat assessment. These are occurring at the Department of Homeland Security's National Biodefense Analysis and Countermeasures Center. Of concern to the U.S. biodefense establishment is that the possibility of advances in genetic engineering will lead to new agents to which populations are vulnerable.[95]

Jonathan Tucker believes that bioresearch on this level poses a weakness for the BW regime because of essentially two reasons: (a) If a novel pathogen is lost or stolen from a bioresearch laboratory, it could have devastating consequences on a non-immune population. (b)

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[92] Tucker, "Preventing."
[93] Arms Control Association, "The BWC at a Glance;" and Tucker, "Biological Threat Assessment."
[94] "The Scowcroft Memorandum," *CBW Conventions Bulletin* no. 57 (September 2002): 2, quoted in Tucker, "Biological Threat Assessment," n. 3.
[95] Tucker, "Biological Threat Assessment."

The restricted transparency surrounding threat assessment research —a necessary security precaution—begins a security dilemma. As a result, adversaries attempt to develop new pathogens, and a cycle emerges. As Tucker states,

> the distinction between defensive and offensive biological R&D is largely a matter of intent …. Rival nations, fearing that the U.S. exploration of emerging biological weapons threats could generate scientific breakthroughs that would put them at a strategic disadvantage, may decide to pursue or expand similar activities. Even if these programs are initially defensive in orientation, they could acquire a momentum of their own that eventually pushes them over the line into the offensive realm.[96]

The same problems are caused by Russian bioresearch. The United States and others do not know whether Russia is developing new pathogens to be used offensively. These two states and any others engaged in biodefense research must find ways to ameliorate concerns about each others' programs if they do not wish that research to create instability to the BW nonproliferation regime.

"The New Biology": No aspect of the biological weapons regime has taken into account the possibility of entirely new types and processes of biological warfare. As noted above, a common concern is virulent, genetically engineered pathogens. What Mark Wheelis, a leading U.S. microbiologist, calls "the new biology" goes much further than manipulating bacterial or viral genes. He notes that future biological capabilities would allow manipulating the nervous system, creating "designer soldiers," and using bio-chemicals in interrogation. He worries about pathogens far more deadly or disabling than have ever been encountered. He foresees the eventual development of synthetic pathogens, chemically produced; "sleeper cell" pathogens that are latent except in response to a given stimulus; and genotype-specific weapons which can be

[96] Tucker, "Biological Threat Assessment."

used for ethnic cleansing.[97] If his analysis is correct, then prevention measures will need to be made to the BW regime in order for it to play any role in combating these awful possibilities.

III. Chemical

The Chemical Weapons regime essentially revolves around the Chemical Weapons Convention. Although it is the most robust regime of any surveyed herein, it nevertheless has its weaknesses. It was hampered by early problems associated with an unproductive OPCW Director-General (Jose Bustani) and slow budget negotiations.[98] Bustani was replaced by Argentina's Ambassador Rogelio Pfirter in July 2002, and although budget constraints are still a problem for the OPCW, member states are slowly working through them. Current regime limitations essentially fall into six categories: (a) membership concerns, (b) lack of national implementation, (c) slow inspection and destruction, (d) resource problems for the OPCW, (e) incomplete declarations, and (f) non-prohibited chemicals.

Membership Concerns: The most hampering weakness of the CW regime is that a number of countries which possess or could produce chemical weapons—including Egypt, Israel, North Korea, and Syria—are not states parties to the Chemical Weapons Convention.[99] As of 19 November 2004, 167 countries had become states parties to the CWC; sixteen had signed but not ratified; and eleven had not signed.[100] Director-General Pfirter noted the importance of bringing outliers into the regime:

> The achievement of the universality of the Convention remains a central objective of the Organisation for the Prohibition of Chemical Weapons (OPCW), and needs to be complemented

[97] Mark Wheelis, "Will the New Biology Lead to New Weapons?" *Arms Control Today* (July/August 2004), at <http://armscontrol.org/act/2004_07-08/Wheelis.asp?print>, accessed 10/18/04.
[98] Robert J. Mathews, "Reviewing the Chemical Weapons Convention: Gently Does It," in *Verification Yearbook 2003*, ed. Trevor Findlay (London: Vertic, 2003), 104, at <http://www.vertic.org/assets/YB03/VY03_Mathews.pdf>, accessed 1/5/05.
[99] Rogelio Pfirter, "Treaty Regimes and Verification: The Chemical Weapons Convention," *Chemical Disarmament Quarterly* (March 2004): 8, at <http://www.opcw.org/docs/cdq_mar2k4.pdf>, accessed 1/5/05.
[100] Organization for the Prohibition of Chemical Weapons, "States Parties to the Chemical Weapons Convention" (29 November 2004), at <http://www.opcw.org/html/db/members_frameset.html>, accessed 1/5/05.

> by measures ensuring its full, effective, and non-discriminatory implementation. A number of states whose non-accession to the Convention is causing serious concern remain outside the realm of this treaty.[101]

Many of the non-parties, especially those in the Middle East, cite national security concerns as reason not to join the Convention. Further, less-developed countries have also complained that treaty membership brings a "lack of tangible benefits" as enticement to join.[102] Despite these objections, as with the Nonproliferation Treaty, as long as outliers exist, enforcement of nonproliferation norms becomes difficult because noncompliant states are under no nonproliferation obligations and the OPCW has no authority to require their compliance.

Lack of National Implementation: Although many states have ratified the CWC, two-thirds of them have not enacted legislation making its provisions national law.[103] At the First Review Conference of the Chemical Weapons Convention, held 28 April—9 May 2003, the participants noted that "… national implementation is one of the essential conditions for the functioning of the Convention and for its full, effective, and non-discriminatory implementation."[104] Applying the treaty through national implementation is necessary in order for states to combat proliferation of chemical weapons. As the Review Conference noted, because some members had not enacted national legislation they, "may … not be able to enforce the prohibitions required by the Convention, to provide legal cooperation to other States Parties, or to afford the appropriate form of legal assistance to facilitate the implementation of the obligations assumed under [the treaty] …."[105]

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[101] Organization for the Prohibition of Chemical Weapons, "Note by the Director-General to the First Review Conference" (17 April 2003), OPCW Document RC-1/DG.1: para. 2.4, at <http://www.opcw.org/docs/rc1dg01.pdf>, accessed 1/5/05.
[102] Mathews, "Reviewing the CWC," 107.
[103] Pfirter, "Treaty Regimes and Verification," 9.
[104] Organization for the Prohibition of Chemical Weapons, "Review Document: As Approved by the First Special Session of the Conference of States Parties to Review the Operation of the Chemical Weapons Convention" (9 May 2003), OPCW Document RC-1/CoW.1, para. 74, at <http://www.opcw.org/html/global/wgrc/2k3/rc1_revdoc.html>, accessed 1/5/05.
[105] Ibid., para. 77.

An associated problem is a need for states to establish a "National Authority" to oversee their own implementation of the CWC. As of the Review Conference, 115 CWC members had established a National Authority, but the Conference "noted with concern … that a large number of States Parties have yet to designate or establish a National Authority, and agreed that this situation needed urgent attention."[106] These two problems indicate that although this regime is moving into the enforcement stage, many countries have not exhibited rule-consistent behavior in implementing its norms. Doing so would solidify the effectiveness of the CW nonproliferation regime.

Slow Inspection and Destruction: Chemical industries in approximately sixty countries have been inspected by the OPCW, but according to Director-General Pfirter, thousands of companies in other countries have not been inspected to date.[107] Nevertheless, industry inspection is progressing slowly but surely, and few expect this to create major problems for the regime. Of larger concern is the slow destruction of chemical weapons, particularly in Russia and the United States. Russia is behind schedule because of political and financial setbacks.[108] It finished destroying 1% of its stockpile in April 2003, but it was supposed to have 20% of its weapons destroyed by April 2002. The OPCW extended its 20% deadline to 29 April 2007, and by 31 December 2007 it is to have 45% of its stockpile destroyed. Russia has asked for an extension to 2012 to destroy its entire cache.[109]

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[106] OPCW, "Review Document," para. 76.
[107] Pfirter, "Treaty Regimes and Verification," 9.
[108] Arms Control Association, "New U.S., Russian Chemical Destruction Deadlines Approved," *Arms Control Today* (November 2003), at <http:// www.armscontol.org/act/2003_11/newsbriefs.asp?print>, accessed 10/18/04.
[109] Arms Control Association, "Russia Destroys 1 Percent of CW Stockpile," *Arms Control Today* (June 2003), at <http://www.armscontrol.org/act/2003_06/briefs_june03.asp?print>, accessed 10/18/04; Arms Control Association, "Chemical Weapons Destruction Begins at Gorny," *Arms Control Today* (January/February 2003), at <http://www. armscontrol.org/act/2003_01-02/briefs_janfeb03.asp?print>, accessed 10/18/04; and Arms Control Association, "New Destruction Deadlines."

Political and operational problems have also delayed the United States' efforts to destroy its chemical weapons.[110] America promised to have 45% of its stockpile destroyed by 29 April 2004 and has asked for an extension to 2007, but experts worry that it will not be able to meet this deadline either since it has only destroyed 27% of its own weapons. The U.S. Department of Defense has indicated that it will ask for a five-year extension of the final deadline (to 2012), but this is probably unrealistic. Current estimates do not predict destruction of America's last chemical agent until around 2014.[111]

In some senses, this weakness is the lesser of all evils. Bureaucratic, political, and logistical obstacles are making it difficult for America and Russia to meet their deadlines, but both states are working toward complete destruction of their stockpiles and few worry that they will stop destruction altogether.

Resource Problems for the OPCW: As noted above, the early days of the OPCW were fraught with disagreement over the size of the organization and the budget it should command. These debates are slowly lessening, especially since the replacement of Bustani brought increased support from member states. Nevertheless, the agreed-upon budgets have made it difficult for the OPCW to juggle its many mandates.[112] The majority of OPCW inspections have involved verification of CW destruction, but as Robert J. Mathews—a CW specialist—notes, the financial burden associated with these inspections will probably increase as the OPCW workload intensifies:

> There will be a substantial increase in the inspection workload for verification of CW destruction facilities (CWDFs) in the next few years as several additional CWDFs begin destruction

[110] Arms Control Association, "New Destruction Deadlines;" for more on reasons for US delays, see Christine Kucia, "U.S. Chemical Weapons Program to Miss Deadline," *Arms Control Today* (October 2003), at <http://www.armscontrol.org/act/2003_10/chemicalweapons.asp>, accessed 1/5/05.
[111] Michael Mguyen, "GAO: U.S. May Miss Chemical Destruction Deadline," *Arms Control Today* (May 2004), at http://www.armscontrol.org/act/2004_05/GAO.asp?print>, accessed 10/18/04.
[112] Mathews, "Reviewing the CWC," 108.

> operations. There are concerns that there will not be enough resources in the OPCW inspectorate to provide the level of verification of destruction based on currently agreed procedures.[113]

Because of this problem, the Review Conference recommended a "thorough review of the current verification methodology" of destruction. It noted that the most effective way to ameliorate this weakness could be in reducing manpower at each CWDF: "Reducing the manpower requirements for the verification of chemical weapons destruction operations was identified as the issue that could have the greatest impact on optimizing verification resource use."[114] The obvious concern with this is that reducing manpower may lessen the OPCW's efficiency.

Incomplete Declarations: As with most multilateral disarmament treaties, member states of the CWC are required to submit an initial declaration upon entry and also to give annual updates. After some initial foot-dragging, as of early 2003 all but two members had submitted their initial declarations.[115] This seemingly heartening statistic, however, is betrayed by the fact that many declarations, both initial and annual, have been incomplete. Part of this is due to the fact that the declaration requirements are complex and many states have logistical and technical difficulties obtaining the required information.[116]

Non-Prohibited Chemicals: In 2003 the Review Conference "requested the [Executive] Council to consider … [new chemicals not prohibited under the CWC] that may be relevant to the Convention, and assess, *inter alia*, whether these compounds should be considered in the context of the Schedules of Chemicals." The problem alluded to in this statement is that some toxic chemicals do not have to be declared under the CWC if they are used for law enforcement

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[113] Mathews, "Reviewing the CWC," 110.
[114] OPCW, "Review Document," paras. 36, 46.
[115] Ibid., para. 24; and The Henry L. Stimpson Center, "Other CWC Implementation Facts" (5 February 2002), at <http://www.stimpson.org/cbw/?sn=CB20011220108>, accessed 12/11/04.
[116] Mathews, "Reviewing the CWC," 111.

purposes, but it would not be difficult to produce and stockpile and then use them for interstate conflicts if needed.

As John Hart, Frida Kuhlau, and Jacqueline Simon note in the *SIPRI Yearbook 2003*, "Non-scheduled toxic chemicals held for non-RCA [riot control agent], law enforcement purposes do not have to be declared, and no voluntary declarations of this nature appear to have been made to the OPCW." In addition, "The CWC does not clearly specify that an RCA can only be used for domestic riot control purposes. In principle, an RCA may be stockpiled for other purposes and … [then] not declared."[117] Although riot control agents are not allowed as a method of warfare, the concern that Hart and the others express is that a state will stockpile the weapons and use them shortly after withdrawing from the Convention.[118]

Ambassador Pfirter also noted with concern this weakness and recommended that states look into closing the loophole:

> …[I]ssues [regarding toxic chemicals used for law enforcement] need to be carefully analyzed so as to prevent any potential harm to the Convention. The Convention contains specific provisions on the use of riot control agents, and otherwise rests on the obligation that Member States shall 'never under any circumstances' develop, produce, otherwise acquire, stockpile or retain, or use CW. The Member States might wish to address these issues.[119]

At a speech to the International Peace Academy in March 2004, Ambassador Pfirter noted that the weaknesses of the chemical weapons regime largely occur from inactivity rather than structural inconsistencies. He said, "It is the view of our Member States … that the Convention's regime is sound and that there are no structural 'gaps' in the CWC. The question

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[117] John Hart, Frida Kuhlau, and Jacqueline Simon, "Chemical and Biological Weapon Developments and Arms Control," in *SIPRI Yearbook 2003: Armaments, Disarmament and International Security* (Oxford: Oxford University Press, 2003)*:* 664, at <http://projects.sipri.se/cbw/research/cbw-yb2003.pdf>, accessed 1/5/05.
[118] Ibid., 665.
[119] OPCW, "Note by the Director-General," para. 3.21.

is not whether something needs to be done differently; it is rather that more needs to be done."[120] Judging from the weaknesses listed above, this seems to be the case.

Even considering the limitations of the CW regime, because (a) it has moved near to the enforcement stage and (b) states are actively meeting and attempting to strengthen it—as manifest by a relatively successful Review Conference[121] and continuing destruction of CW stockpiles—its shortcomings should probably not cause as much concern as those associated with the other two regimes. This analysis will now turn to the actions taken by the international community to strengthen all of these institutions.

WINDS OF CHANGE—STRENGTHENING THE NONPROLIFERATION REGIMES

Policymakers, scholars, and world leaders are keenly aware of the threats posed by weapons of mass destruction as well as the weaknesses existent within the nonproliferation regimes. Despite criticism that the world is not moving fast enough to address these problems, the fact that initiatives are being proposed and enacted to strengthen these regimes suggests that winds are changing. This section will survey those initiatives and seek to address how they are structured to ameliorate many of the weaknesses outlined above. Since some of these activities and recommendations are meant to address WMD proliferation as a whole, this section will not be subdivided into nuclear, biological, and chemical initiatives.

The Proliferation Security Initiative: Acting on intelligence that North Korea was covertly shipping weapons materials to a Middle Eastern country in 2002, the United States asked Spain to interdict a vessel heading for Yemen. After a brief showdown, the ship allowed the interdiction, during which a number of SCUD missiles were discovered. Yemen took responsibility for them, saying that it bought them from North Korea and was entitled to them for

[120] Pfirter, "Treaty Regimes and Verification," 9.
[121] See Mathews, "Reviewing the CWC," 117.

defensive purposes. Under international law, the Bush Administration could do nothing to stop the shipment from proceeding—there is nothing illegal about buying and selling missiles on the international market—and, embarrassingly, allowed it to proceed to its destination.

Frustrated by this experience, the Bush Administration announced in May 2003 the organization of the Proliferation Security Initiative (PSI).[122] This initiative is designed to counter trafficking in all types of WMD. The PSI was initially composed of Australia, France, Germany, Italy, Japan, The Netherlands, Poland, Portugal, Spain, the United Kingdom, and the United States, and later joined by Canada, Denmark, Norway, Singapore, Turkey, and Russia.[123] It is an agreement between these member countries and about sixty other supporting states that is "focused on pre-emptive interdiction, seeking to allow ships, aircraft, and vehicles suspected of carrying WMD-related materiel to and from countries of 'proliferation concern' … to be detained and searched as soon as they enter member countries' territory, territorial waters, or airspace."[124] The PSI is intended to seize shipments of WMD and dual-use goods, as well as missiles and materials used for delivery systems which may be intended for terrorists or states suspected of trying to acquire WMD.[125]

The PSI has mostly been targeted against proliferation to and from North Korea. It is not meant to interrupt trade from countries seen as coalition allies, including India, Israel, and

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[122] Rebecca Weiner, "Proliferation Security Initiative to Stem Flow of WMD Materiel," *Monterey Institute of International Studies* (16 July 2003), at <http://cns.miis.edu/pubs/week/030716.htm>, accessed 3/20/04.
[123] Wade Boese, "Countries Draft Guidelines for Intercepting Proliferation," *Arms Control Association* (September 2003), at <http://www.armscontrol.org/act/2003_09/Proliferationinitiative.asp>, accessed 4/23/04; "Russia Expresses Support for US Non-Proliferation Security Initiative," *Daily Times* (2 May 2004), at <http://www.dailytimes.com.pk/default.asp?page=story_8-4-2004_pg7_49>, accessed 5/02/04; Wade Boese, "Russia Joins Proliferation Security Initiative," *Arms Control Today* (July/August 2004), at <http://www.armscontrol. org/act/2004_07-08/PSI.asp?print>, accessed 10/18/04; and U.S. Department of Defense, "US Deputy Defense Secretary Paul Wolfowitz on the Proliferation Security Initiative, December 17" *The Acronym Institute for Disarmament Diplomacy* (17 December 2003), at <http://www.acronym. org.uk/textonly/docs/0312/doc14.htm>, accessed 3/20/04.
[124] Weiner, "Proliferation Security Initiative."
[125] Arms Control Association, "The Proliferation Security Initiative (PSI) At a Glance" (December 2003), at <http://www.armscontrol.org/factsheets/PSI.asp?print>, accessed 3/20/04.

Pakistan, even though all three of these have nuclear arsenals and Pakistan was recently involved in the A.Q. Khan proliferation scandal.[126] Josi Joseph, a homeland security and defense consultant, supported this assertion by noting:

> There are unquestionably states that are not within existing treaty regimes that possess weapons of mass destruction…. We're not trying to have a policy that attempts to cover each and every one of those circumstances. What we're worried about are the rogue states and the terrorist groups that pose the most immediate threat.[127]

The PSI is designed not to become an international organization. Indeed, John Bolton, U.S. Undersecretary of State for Arms Control and International Security (and the main U.S. architect of the plan), and Paul Wolfowitz, U.S. Deputy Secretary of Defense, have downplayed the idea of further membership, noting that it has been set up specifically as an international "activity," not an organization.[128] The reasons for this approach are unclear but may reflect, if nothing else, a desire to keep the activity from turning into a bureaucratic structure capable of acting on its own. A few large countries have not endorsed the initiative, the most important of which is China. [129]

Perhaps the greatest uncelebrated victory for the PSI was its February 2004 inclusion of Panama and Liberia as cooperating parties. Half of the worlds' shipping is registered under six "flag of convenience" (FOC) states that feature very simple registration policies, making it easy for illicit traffickers to register cargo under a state flag. Two of these countries—Panama and Liberia—represent one-third of the world's shipping.[130] In the 2004 agreement, Liberia and

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[126] See Weiner, "Proliferation Security Initiative;" and Arms Control Association, "PSI At a Glance."
[127] Jofi Joseph, "The Proliferation Security Initiative: Can Interdiction Stop Proliferation?" *Arms Control Today* (June 2004), at <http://www.armscontrol.org/act/2004_06/Joseph.asp?print>, accessed 10/18/04.
[128] Arms Control Association, "PSI At a Glance"; and U.S. Department of Defense, "Wolfowitz on the Proliferation Security Initiative."
[129] Wade Boese, "Interdiction Initiative Participants Agree on End, Differ on Means," *Arms Control Today* (November 2003): 38.
[130] The remaining FOC states are the Bahamas, Malta, Cyprus, and the Marshall Islands. Mark Rosen, "Global Security: The Proliferation Security Initiative," Intellibridge (21 September 2003); and Judith Miller, "Panama Joins Accord to Stem Ships' Transport to Illicit Arms," *New York Times* (11 May 2004); both noted in Joseph, "The PSI," notes 25 and 26, respectively.

Panama agreed with the United States that America could inspect any of their ships which it suspected of carrying illicit cargo, and vice versa. The United States is working to procure similar agreements with the other four FOC parties. Some argue that the arrangements should be enlarged to the multilateral level so any member of the PSI can interdict Liberian and Panamanian vessels, not just America.[131]

The legal basis of the Proliferation Security Initiative is set on three elements: (a) States may interdict a vessel when it is flying no flag because it can be considered a pirate ship. (b) Interdiction is possible when permission is given by the country whose flag is flown on the vessel. (c) It is legal under Article 51 of the UN Charter because the existence of WMD presents a threat and should be interdicted in an act of self defense.[132] This latter justification is fading quickly from policymaker discourse because it received a negative reaction domestically and internationally when it was first introduced.[133]

Under the Law of the Sea Convention,[134] ships have the right to open transit on the high seas unless they are involved in piracy or the slave trade. WMD are not yet considered illegal commodities.[135] In territorial waters, states have the right to set limits concerning what is illegal in their waters, but customary law has generally given ships the right of "innocent passage"—meaning that they may enjoy passage through territorial seas "as long as it is not prejudicial to the peace, good order or security of the coastal state."[136]

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[131] Joseph, "The PSI.'
[132] Greg Sheridan, "US 'Free' to Tackle N. Korea," *The Australian* (9 July 2003), noted in Weiner, "Proliferation Security Initiative," n. 10.
[133] Joseph, "The PSI."
[134] This has not been ratified by the United States but is considered customary international law. See Sue Soo-ha Yang, "Legal Basis for State Interception of Shipments on High Seas: Legality of the Naval Interdiction under the 'Proliferation Security Initiative'," (Paper for Brooklyn Law School, 1 October 2003), 7, at <http://www.lcnp.org/disarmament/MEMO_NK_interdiction.PDF>, accessed 4/23/04.
[135] Ibid.
[136] The United Nations Convention on the Law of the Sea, UN Document A/CONF 62/122 (10 December 1982), Art. 19, quoted in Yang, "Legal Basis," 6, n. 21.

Other than those laws included in the three elements listed earlier, few international rules exist allowing interdiction on the high seas. Many scholars believe new law could develop through one of two channels—if the PSI coalition were to sponsor an international convention allowing for interdiction of WMD on the high seas, or if the UN Security Council was to make shipping WMD as illegal as shipping slaves. The advantage of an international convention is that it would, if passed by a large majority of states, essentially establish customary international law.[137] A Security Council resolution would have the advantage of requiring states to draft the principle into domestic legislation and would serve as a basis for further action to be taken if states do not comply.

Coalition members are attempting to avoid both of these measures at the current stage,[138] and Bolton is hoping to create a third alternative—to establish customary law without either a convention or a resolution, but instead simply through concerted action. His hope is that if a number of states ally themselves to act in a certain manner, customary law will emerge.[139] Critics are quick to point out, however, that customary law can only be made when a norm becomes nearly universal, not when it is simply practiced by a handful of states.[140] Bolton averred that, ultimately, if legal authority for an interdiction is ambiguous, states may eventually go to the Security Council for authorization.[141]

To date, PSI action has mainly focused around interdicting shipments, although President Bush recently called for it to begin involving more than just shipments and transfers.[142] And the PSI has had documented successes. It was a PSI action that intercepted aluminum tubes headed

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[137] Proliferating countries would not pass such a convention, but if everyone else did, it would still become binding on them. See Yang, "Legal Basis," 13.
[138] Weiner, "Proliferation Security Initiative."
[139] Boese, "Interdiction Initiative Participants," 38.
[140] Yang, "Legal Basis," 14.
[141] Robbins, "The U.N.: Searching for Relevance"; and Arms Control Association, "PSI At a Glance."
[142] Bush, "Remarks on WMD Proliferation."

for Libya, and this revelation began the process toward Libya's disarmament.[143] Other successes include the interdiction of aluminum tubes on a French ship in Egypt bound for what authorities believe was North Korea, the interception of sodium cyanide—also possibly bound for North Korea—by the French and Germans, and the beefing up of safety inspections and customs examinations of a Japanese-North Korean ferry line, which resulted in the suspension of the service.[144]

Besides the legal shortcomings the PSI faces, it is undermined not by what it is focusing on (North Korea), but by what it is not focusing on—proliferating or demanding states besides North Korea. Japan has explicitly noted a concern that "the PSI has become overly preoccupied with North Korea, while it was intended to encompass all trade in WMD materiel, including countries like Iran, Syria, and Cuba."[145] In order to strengthen the initiative, the focus should be to apply the measure to all states of proliferation concern.

For major powers to agree to the measure, it will first be necessary to sell China on its merits. Because China has ties to North Korea, "China … could ultimately determine the initiative's effectiveness …. Absent Chinese support, North Korea could bypass an initiative dragnet by importing or exporting WMD or related goods via Chinese territory or airspace."[146] Also, as long as China and others are not involved in the initiative, proliferators can "seek to shield their exports and imports to restricting their trade as much as possible to the territory of

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[143] Joseph, "The PSI."
[144] David E. Sanger, "Cracking Down on the Terror-Arms Trade," *New York Times* (15 June 2003), noted in Weiner, "Proliferation Security Initiative," n. 21.
[145] Weiner, "Proliferation Security Initiative," noting (n. 19) John Kerin, "Fear US Will Push N Korea Into Fight," *The Australian* (10 July 2003).
[146] Boese, "Interdiction Initiative Participants," 38.

countries not participating in the initiative."[147] Said differently, without universal participation, proliferators will simply calculate which countries' ships and ports to avoid using.[148]

China fears that the PSI could harm the strained situation with North Korea, noting that: "Quite some countries have doubts over the legality and effectiveness of the [initiative]. Under such circumstances, one should act in a prudent manner."[149] The criticism may also be due to the fact that China could be proliferating. George Tenet, in the testimony mentioned above, explicitly stated that China is a prime supplier of missile equipment, saying, for example, that "Chinese firms continue to supply Iran and Pakistan with missile technologies."[150] In fact, China tops the list of countries sanctioned by the United States for proliferation of WMD-related materiel.[151]

A more serious problem, perhaps, is posed by the countries the coalition does not target at all. For example, Pakistan has not been a focus of interdiction because it is an ally in the war on terror, but the recent A.Q. Khan proliferation scandal proves that its activities have been equally as damaging to international security as anything that North Korea propagated. The goal of the initiative is to target rogue states and terrorists, but because it has not focused on all states of proliferation concern, terrorists have, until recently, had a good chance at getting nuclear materiel from the Khan network.[152] After China, India and Moldova fall next on the list of states most sanctioned by the United States for proliferating WMD-related technology,[153] but neither of these are targets of the PSI because they have relatively good relations with the United States.

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[147] Wade Boese, "U.S. Pushes Initiative to Block Shipments of WMD, Missiles," *Arms Control Today* (July/August 2003): 26.
[148] Robbins, "The U.N.: Searching for Relevance."
[149] Quoted in Wade Boese, "Interdiction Initiative Starts to Take Shape," *Arms Control Today* (October 2003): 24.
[150] Quoted in Kerr, "Intelligence Chiefs," 19.
[151] Wade Boese, "Bush Emphasis on Proliferation Sanctions Stirs Debate," *Arms Control Today* (September 2003), at <http://www.armscontrol.org/act/2003_09/proliferation%20sanctions.asp?print>, accessed 4/20/05.
[152] See Bernard-Henri Levy, "Abdul Qadeer Khan," *Wall Street Journal* (17 February 2004): A20.
[153] Boese, "Bush Emphasis on Proliferation."

The problem becomes apparent: if this technology falls into the possession of terrorists or rogue states, it is still WMD technology no matter who it comes from.

Ultimately, for the PSI to be effective in curbing proliferation it must be based on a system wherein interdiction is legal on the high seas and no major state (including FOC countries) stands outside of the initiative. Noncompliance by even two or three key nations will jeopardize the effectiveness of the activity in quelling proliferation. Creating such a system will be difficult diplomatically, but it is the only option that provides assurance that transportation of nuclear materials is being controlled.

UN Security Council Resolutions: President Bush has repeatedly called for the Security Council to outlaw proliferation, and the Council answered his calls to a certain extent. His first request occurred during his 2003 remarks to the United Nations General Assembly, wherein he announced: "Today, I ask the UN Security Council to adopt a new anti-proliferation resolution. This resolution should call on all members of the UN to criminalize the proliferation of … weapons of mass destruction, to enact strict export controls consistent with international standards, and to secure any and all sensitive materials within their own borders."[154] He reiterated this request in his February speech to the National Defense University.[155]

In March 2004, the Security Council passed Resolution 1540, aimed at making it difficult for nonstate actors to engage in proliferation. The resolution required states to enact "appropriate, effective" laws to keep nuclear, biological, and chemical weapons out of the hands of nonstate actors. States are also to impose controls and safeguards on precursor materials that could be used to manufacture weapons of mass destruction. The resolution called on countries to

[154] George W. Bush, Remarks to the United Nations General Assembly, UN Document A/58/PV.7 (23 September 2003), at <http://ods-dds-ny.un.org/doc/UNDOC/GEN/N03/527/97/PDF/N0352797.pdf?OpenElement>, accessed 4/23/04.
[155] Bush, "Remarks on WMD Proliferation."

take cooperative action against illicit trade, although it did not specifically require participation in the PSI. The meaning of "appropriate, effective" is left up to states to determine.[156]

This resolution is useful in combating terrorism, but it does not go as far as Bush originally outlined in his request for a resolution to outlaw proliferation altogether, and it seems that no further efforts have been undertaken. The reasons for this are unclear, but could relate to the fact that many states are uncomfortable with the Security Council "legislating" international norms. They may instead prefer that those norms appear through international consensus.

The continued effectiveness of 1540 is still to be determined. As of December 2004, only one-third of UN members had submitted reports detailing their actions to keep nonstate actors from acquiring weapons of mass destruction. Some countries argue that they do not have WMD and therefore do not need to make a declaration, but America believes that (as the Khan scandal evidenced) it is necessary for all states—even those which do not possess WMD—to participate in this initiative.[157]

Mohamed ElBaradei's Proposals and Similar Counterparts: Dr. ElBaradei has given a number of recommendations to strengthen the nuclear nonproliferation regime. When asked his views on the Proliferation Security Initiative, Dr. ElBaradei noted that:

> If you want really to deal adequately with proliferation you really need to start at the root causes and not just at the late stage when the countries are already engaged in commerce…. [Ultimately we must] strengthen control of highly enriched uranium and plutonium by making sure that this part of the fuel cycle is really not subject to national control—by possibly international or multinational control.[158]

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[156] Wade Boese, "Security Council Unanimously Adopts Resolution on Denying Terrorists WMD," *Arms Control Today* (May 2004), at <http://www.armscontrol.org/act/2004_05/UN.asp?print>, accessed 10/18/04; and United Nations Security Council, Resolution 1540, UN Document S/Res/1540 (2004), at <http://daccessdds.un.org/doc/UNDOC/GEN/N04/328/43/PDF/N0432843.pdf?OpenElement>, accessed 1/5/05.
[157] Wade Boese, "U.S. Disappointed with Worldwide Response to WMD Resolution," *Arms Control Today* (December 2004), at <http://www.armscontrol.org/act/2004_12/WMDResolution.asp?print>, accessed 12/30/04.
[158] "Interview with Dr. Mohamed ElBaradei," 39.

This proposal—to put the nuclear fuel cycle under multinational control—is one of three primary proposals presented by Dr. ElBaradei as options to strengthen the nonproliferation regime. As part of this initiative, the international community would limit the processing of weapons-usable material in civilian programs as well as the production of new material by "agreeing to restrict these operations exclusively to facilities under multinational control."[159]

Little has been offered as detail regarding how this process would work. ElBaradei noted that the program would require certain transparency measures and the assurance that users could obtain the supplies that they need.[160] Additional funding and staff to whatever organization oversees the initiative may be necessary, depending on its complexity. To appease those concerned with ceding sovereignty over production of a strategic material to the international community, agreed-upon caveats could be written into the system to allow supplier states to retain unilateral control over certain program elements (but not whole programs) in order to protect state secrets. Further, conditions for allowing withdrawal from the initiative could be considered. Withdrawal would have to be seen as a breach of the system, however, and it would be necessary that it be followed by an immediate response from the international community, perhaps through an automatic review of the situation by the Security Council.

President Bush made a similar proposal in his NDU speech. He correctly stated that civilian nuclear programs do not need enrichment or reprocessing technology to function and proposed that the NSG continue selling fuel for nuclear reactors only to receiving states that renounce enrichment and reprocessing. The NSG would also not allow any sales of enrichment or reprocessing technology to states that do not already possess it. The measure would be

[159] ElBaradei, "Towards a Safer World."
[160] Ibid.

calculated to prevent any new states from developing such technology.[161] The weaknesses in this proposal are in what to do with those states that already have the technology who are not part of the Nuclear Suppliers Group, like Pakistan or North Korea, and what to do with NSG suppliers who cheat. ElBaradei's plan to put the nuclear fuel cycle under multinational control would overcome these weaknesses if, of course, all supplier states can be convinced to participate. Convincing suppliers, however, will be very difficult.

A second key proposal given by Dr. ElBaradei is to deploy nuclear energy systems which, "by design, avoid the use of materials that may be applied directly to making nuclear weapons."[162] This recommendation basically asserts that future reactors should be "light water"—using low-enriched uranium instead of highly-enriched uranium—and that medical uses of HEU should slowly be converted to LEU processes.[163]

The third major recommendation in ElBaradei's plan is to consider "multinational approaches to the management and disposal of spent fuel and radioactive waste."[164] He notes that problems occur because many countries are not storing their waste correctly:

> More than 50 countries have spent fuel stored in temporary sites, awaiting reprocessing or disposal. Not all countries have the right geology to store waste underground and, for many countries with small nuclear programmes for electricity generation or for research, the costs of such a facility are prohibitive. Considerable advantages—in cost, safety, security and non-proliferation—would be gained from international co-operation in these stages of the nuclear fuel cycle.[165]

Approximately 1/3 of the spent fuel around the world is spent HEU, and currently about 130 research reactors run on weapons-grade HEU. Of particular concern are decommissioned research reactors—of the 382 that are not operating, less than half have been decommissioned. In some of the cases, unused HEU exists with the inoperative reactors. This is especially

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[161] Bush, "Remarks on WMD Proliferation."
[162] ElBaradei, "Towards a Safer World."
[163] Ibid.
[164] Ibid.
[165] Ibid.

dangerous because unused HEU is considerably less radioactive than used HEU, and although a thief would be pleased to obtain either, unused HEU is easier to steal and transport because of its relatively low radioactivity.[166]

To act on the two preceding concepts, in May 2004 U.S. Energy Secretary Spencer Abraham announced the Global Threat Reduction Initiative, designed to end the use of HEU for research reactors and retrieve all U.S. and Russian-exported HEU. The program is billed at $450 million and is intended to retrieve some 29,000 kilograms of uranium from overseas. The goal is to finish by 2010.[167]

The IAEA is also working with member states to overcome these problems. Since August 2002, it has assisted Serbia and Montenegro, Bulgaria, Romania, and Libya in transferring fresh HEU stocks to other countries where they can be blended with other ingredients to make LEU. More return shipments are in the planning stages. It is also working with other member states to enhance security at nuclear sites, provide training and guidance to correct institutional shortcomings, encourage states to sign the Code of Conduct on the Safety of Research Reactors to establish a common safety culture, and provide monitoring equipment.[168] Like the initiatives in the former Soviet Union, the IAEA is defusing only a fraction of the problems, but the hope is that this lowers overall risk, even though much more is needed.

Besides the three ideas mentioned above, ElBaradei has also recommended a few less publicized proposals to strengthen the nuclear nonproliferation regime:

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[166] Kirstie Hansen, "Research Reactors and Security: IAEA Promotes Research Reactor Safety," *International Atomic Energy Agency* (8 March 2004), at <http://www.iaea.org/PrinterFriendly/NewsCenter/Features/ResearchReactors/security20040308.html>, accessed 3/20/04.
[167] Wade Boese, "Abraham Announces Nuclear Initiative," *Arms Control Today* (July/August 2004), at <http://www.armscontrol.org/act/2004_07-08/Abraham.asp?print>, accessed 10/18/04.
[168] Hansen, "Research Reactors."

• "Turn off the tap": Dr. ElBaradei called for a renewed look at the Fissile Material Cutoff Treaty (FMCT), which would ban the production of fissile material for weapons use. Interestingly, although the Bush Administration has generally been averse to promoting international treaties which constrain its ability to act in the nuclear realm, until a recent decision to take its policy under review,[169] it has also been supportive of reviving the FMCT. Its efforts, however, have been bogged down by demands from others who want parallel negotiations on proposals the United States disagrees with, namely talks to prevent an arms race in space and complete nuclear disarmament.[170]

• No withdrawal from the NPT: Dr. ElBaradei recommended amending the Nonproliferation Treaty so that no country would be allowed to withdraw. His justification is that "[a]ny nation invoking this escape clause is almost certainly a threat to international peace and security."[171] He noted that if this could not happen, then at a minimum, "withdrawal should prompt an automatic review by the United Nations Security Council."[172] Considering the universality of the nonproliferation regime, it is possible to imagine that making withdrawal a trigger for SC review would have a chance of passing. Outlawing withdrawal altogether, however, would likely be quite difficult—states would ultimately feel they needed to keep the escape clause "just in case."

• De-legitimize nuclear weapons and disarm: As seen above, ElBaradei has consistently tied his arguments to the fact that the nonproliferation regime is connected to the nuclear

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[169] Arms Control Association, "U.S. Reviewing FMTC Policy," *Arms Control Today* (November 2003), at <http://www.armscontrol.org/act/2003_11/newsbriefs.asp?print>, accessed 10/18/04.
[170] Wade Boese, "Bush Administration Releases Strategy on WMD Threats," *Arms Control Today* (January/February 2003): 22, 34.
[171] Mohamed ElBaradei, "Saving Ourselves from Self-Destruction," *New York Times* (12 February 2004), available at <http://www.iaea.org/NewsCenter/Statements/2004/ebNYT20040212.html>, accessed 4/23/04.
[172] Ibid.

disarmament regime, so the ultimate way to stop proliferation is to de-legitimize the appeal of nuclear weapons and completely disarm. He notes that:

> [T]he pursuit of weapons of mass destruction … can be expected as long as we fail to introduce alternatives that redress the security deficit. We must abandon the unworkable notion that it is morally reprehensible for some countries to pursue weapons of mass destruction yet morally acceptable for others to rely on them for security—and indeed to continue to refine the capacities and postulate plans for their use.[173]

In order for nonproliferation to work, the goal must be to destroy the drivers behind why countries want WMD. ElBaradei says, in fact, that the ultimate solution to the problem of proliferation is to take the nonproliferation regime to the enforcement stage, to make it "a regime which prohibits nuclear weapons, which is universally applied and which is regarded as a peremptory norm of international law, which means that whether you are in or out, you are bound by that regime."[174]

A comforting trend throughout ElBaradei's proposals is that the United States avers with much of what he has recommended. Indeed, President Bush and Dr. ElBaradei have met more than once and agreed publicly on given measures like securing weapons-usable material in research reactors.[175] This is not to say the Bush Administration agrees with all of ElBaradei's ideas—indeed, few will ever wager that Bush will promote complete disarmament, and recent media reports indicate that the Administration would like to see Dr. ElBaradei replaced with someone more supportive of its policies.[176] But the fact that the world's "hyperpower" agrees with ElBaradei on multiple proposals and is promoting many of his recommended measures is a good indicator that the nuclear nonproliferation regime is not dead and will hopefully be strengthened as the future unfolds.

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[173] ElBaradei, "Saving Ourselves."
[174] Arms Control Association, "Curbing Nuclear Proliferation," 4-5.
[175] International Atomic Energy Agency, "IAEA Director General, US President Conclude High-Level Talks" (18 March 2004), at <http://www.iaea.org/PrinterFriendly/NewsCenter/News/2004/talks1803.html>, accessed 3/20/04.
[176] George Jahn, "U.S. Wants to Replace U.N. Nuke Leader," *Daily Herald* (9 January 2005): AA1.

The G8 Initiative and the Nunn-Lugar Program: At the G8 Summit in June 2003, the leaders described the proliferation of WMD as "the preeminent threat to international security."[177] Their statement called for diplomatic and other measures to stop proliferation, and they established the Global Partnership Against the Spread of WMD. Through this initiative, the G8 committed a total of $20 billion through 2013 to help safeguard and destroy nuclear weapons and radiological materials in Russia.[178]

This measure should act as a nice complement to the ongoing Nunn-Lugar Cooperative Threat Reduction Program which has been sponsored since the early 1990's by the United States. To date, the Nunn-Lugar Program has succeeded in removing all nuclear warheads from Ukraine, Belarus, and Kazakhstan after the breakup of the Soviet Union. It has also overseen the elimination of bombers, missiles, and missile silos, as well as the housing of rocket forces, the establishment of nuclear safety initiatives, and the conversion of biological and chemical weapons facilities for peaceful uses. Admittedly, the program has had setbacks stemming periods of inadequate funding, poor control of in-country projects, and sometimes insufficient cooperation from the other side. On the whole, however, the program has reduced the risk of uncontrolled WMD, especially nuclear materials, in the former Soviet Union.[179]

It is correct to fund programs to reduce the threat loose nuclear materials pose, for, as Matthew Bunn has written, "[t]he most critical and cost-effective step to prevent nuclear terrorism is to secure nuclear weapons and their essential ingredients at their source."[180] U.S. Representatives Weldon and Edwards have noted that "[o]f paramount importance to the lives

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[177] Christine Kucia, "Western Governments Assess Nonproliferation Measures," *Arms Control Today* (July/August 2003): 27.
[178] Ibid., 27.
[179] Pat Harahan, Historian, Defense Threat Reduction Agency, "Cooperative Threat Reduction Program," presentation given at the Fletcher School of Law and Diplomacy, Medford, MA, 30 March 2004, notes in possession of author.
[180] Bunn, *Preventing Nuclear Terrorism*.

and safety of the American people are the massive stockpiles of nuclear weapons and materials and the expertise for building them that Russia and the other independent states inherited from the Soviet Union."[181] As noted above (see *The Threat*), estimates say that more than 1500 tons of weapons-usable material exists in the former Soviet Union, and theft of some of that material has occurred.

Some worry, however, that the money spent on the G8 initiative and the Nunn-Lugar program is entirely insufficient. In 2001, Senate Republican Leader Howard Baker testified: "It really boggles my mind that there could be 40,000 nuclear weapons [in Russia][182] … poorly controlled and poorly stored, and that the world is not in a near-state of hysteria about the danger."[183] A 2001 bipartisan task force chaired by Baker and White House Counsel Lloyd Cutler concluded that "an effort in the magnitude of $30 billion over eight to ten years [is] necessary in order to deal with nuclear threat reduction and non-proliferation problems in Russia."[184] The $20 billion from the G8 will give a significant boost to what before had been a commitment of about $1 billion/year. Unfortunately, as Weldon and Edwards note, this money is "spread over a much broader range of problems than preventing the proliferation of Russia's nuclear weapons, materials, and know-how."[185] They ultimately conclude that what has been appropriated is not enough and that the programs

> are too small and have been operating at a pace that does not match the size and urgency of the problem…. Even by October 2004, comprehensive upgrades will not have been completed at facilities containing enough material for more than 22,000 nuclear weapons. This is far too risky given that a recent CIA report faulted the security of the Russian nuclear arsenal facilities, noting that 'undetected smuggling has occurred.'[186]

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[181] Weldon and Edwards, "Post-Hussein Era," 16.
[182] This number seems to be an exaggeration. See the numbers presented in the final recommendation of this paper.
[183] Quoted in Allison, "How to Stop Nuclear Terror," 66.
[184] Weldon and Edwards, "Post-Hussein Era," 17, noting (n. 10) "A Report Card on the Department of Energy's Nonproliferation Programs with Russia," Task Force of the Secretary of Energy Advisory Board (January 2001).
[185] Weldon and Edwards, "Post-Hussein Era," 17.
[186] Ibid., 16, noting (n. 5) Central Intelligence Agency, "Annual Report to Congress on the Safety and Security of Russian Nuclear Facilities and Military Forces" (February 2002), available at <http://www.cia.gov/nic/pubs/other_products/icarussiansecurity.htm>, not accessed.

This concern is compounded by the fact that although the G8 promised funds for its initiative in 2001, as of mid-2004 all of the non-U.S. participants were behind in paying their apportionment of the cost. If the funding base had not been boosted by adding donor countries, the Global Partnership would be in particular trouble.[187]

Other critics argue that too much money is being spent on the FSU—that funding the destruction and security of current Russian stockpiles simply opens up resources that Russia can apply to new WMD programs. This may be the case, but a counterargument can be made that the goals already achieved have a priceless value. For example, as noted, the Nunn-Lugar Program succeeded in helping eradicate nuclear warheads from the territories of Ukraine, Belarus, and Kazakhstan. That achievement alone is arguably worth all of the money spent on all of the programs to date, and if it had not yet been achieved, we would likely want to achieve it. To consider that not only have those three states been disarmed of nuclear weapons, but also that the West has made significant, although not comprehensive, strides at securing the Russian radiological stockpile, is to admit that risk from those materials has decreased since the fall of the Soviet Union. Risk from other, new weapons of mass destruction may now exist if Russia has diverted funds to new programs, but it is at least notable to mention that Russian materials are safer today than they would be if Western programs had not been initiated; and because of these programs, the chances of a non-state actor acquiring loose Russian nuclear materials—although nowhere near zero—are lower than they otherwise would be.

"The Duty to Prevent": In his 2003 General Assembly speech, Secretary-General Annan noted that the members of the Security Council "may need to begin a discussion on the criteria

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[187] Gabrielle Kohlmeier, "G-8 Summit Advances Bush Proposals," *Arms Control Today* (July/August 2004), at <http://www.armscontrol.org/act/2004_07-08/G8.asp?print>, accessed 10/18/04; and Bunn, *Preventing Nuclear Terrorism.*

for an early authorization of coercive measures to address certain types of threats [such as terrorists with WMD]."[188] In 2004, Mohamed ElBaradei said he believed that "[i]f the Security Council … finds a country's withdrawal from the NPT a precursor to a situation that could threaten international peace and security, then the Security Council can intervene and intervene early on."[189] This echoed somewhat a 2003 EU statement noting that coercive measures are acceptable to stop WMD proliferation if they happen under the auspices of a Security Council resolution.[190] We saw with the Iraq War that the American Administration took this logic even one step further—that if a threat seems serious enough, unilateral action can be justified with or without a Security Council resolution.

In a January/February 2004 *Foreign Affairs* article, Lee Feinstein and Anne Marie Slaughter articulated a new notion which tied these ideas to what they called a "duty to prevent." Their argument is unique because it correlates the nonproliferation regimes with the human rights regime and advocates using collective measures (forceful and other) to prevent closed states with unstable dictators from acquiring weapons of mass destruction. They analogize with gun control laws—as gun control is targeted to criminals, prevention should be targeted to actors with suspect intentions.[191]

They write that the "duty to prevent" is analogous to the "responsibility to protect" people from human rights violations:

> The responsibility to protect is based on a collective obligation to avoid the needless slaughter or severe mistreatment of human beings anywhere—an obligation that stems from both moral principle and national interest. The corollary duty to prevent governments without internal checks from developing WMD capacity addresses the same threat from another source: the prospect of

[188] Annan, Remarks at the General Assembly.
[189] "Interview with Dr. Mohamed ElBaradei," 39.
[190] Christine Kucia, "Western Governments Assess Nonproliferation Measures," 27.
[191] Lee Feinstein and Anne-Marie Slaughter, "A Duty to Prevent," *Foreign Affairs* 83, no. 1 (January/February 2004): 143-5.

> mass murder through the use of WMD, which have a destructive potential far beyond the control of any attacker.[192]

The three critical features of the duty to prevent are (a) seeking to control the proliferation of WMD and the people that possess them, (b) emphasizing prevention, and (c) the use of collective action to realize these goals.[193]

Feinstein and Slaughter argue that keeping the option of force on the table is necessary, but military force should be the last alternative in a hierarchy of measures and should be exercised collectively. New actions, they write, could include indicting criminals in international courts. For example, the Security Council may have been more apt to oust Saddam Hussein because of his human rights violations than because of his WMD. If he and his cronies had been indicted in an international court for crimes against humanity and failed to show up voluntarily, the Security Council may have been willing to approve force to effect their eviction from Iraq.[194]

This argument may have credence. The international community may be far more effective at quelling proliferation if it focuses on a larger picture of the proliferators or demanders that are of concern. Not only would the ability to stop proliferation increase, but those who advocate action will have a stronger legal base for doing so.

Permanent Inspectors: At the same General Assembly commencement wherein President Bush called for the criminalization of proliferation, French President Jacques Chirac recommended the creation of a permanent corps of weapons inspectors and called for a "summit meeting of the Security Council to frame a genuine United Nations action plan against

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[192] Feinstein and Slaughter, "A Duty to Prevent," 150.
[193] Ibid., 136-150.
[194] Ibid., 145-8.

proliferation."[195] Hans Blix later added his support for a permanent corps of inspectors.[196] Although few will disagree with Chirac's recommendation to frame an action plan, his call for a permanent group of inspectors has not gained momentum. Some believe that a positive outcome of this plan is that it would help deal with difficult proliferation cases because it would be seen as a pre-existing body, not something thrown together for "political" reasons.[197] It would signal that the international community is serious about ensuring proliferation does not occur. The major con is that it would undermine organizations already existing to carry out inspections. Especially in relation to nuclear proliferation, an inspectorate would duplicate the work of the IAEA. Another possible problem is that it would appear to be a lackey of the permanent five (P5) members of the Security Council instead of an independent body.[198]

Washington's Alternatives to the BWC Protocol: After the United States scuttled the talks on establishing a BWC enforcement mechanism, Washington proposed a package of recommendations meant to have the same effect without a supranational authority. The Bush Administration recommended that because the treaty norms are not illegal in many member states, BWC parties should first enact national legislation criminalizing what is prohibited and should make it easy to extradite people for BW-related crime. Second, Washington recommended that states agree to allow the UN Secretary-General to investigate possible bio-weapon use or outbreaks of disease. Third, BWC members should elaborate provisions for resolving compliance concerns. Some ways to do this may include information exchange and

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[195] Jacques Chirac, Remarks to the United Nations General Assembly, UN Document A/58/PV.7 (23 September 2003), at <http://ods-dds-ny.un.org/doc/UNDOC/GEN/N03/527/97/PDF/N0352797.pdf?OpenElement>, accessed 3/24/04.
[196] Arms Control Association, "Getting It Right the Next Time: An Interview with Hans Blix," *Arms Control Today* (July/August 2004), at <http://www.armscontrol.org/act/2004_07-08/Blix.asp?print>, accessed 10/18/04.
[197] Arms Control Association, "Arms Control Experts Comment on Bush Nonproliferation Proposals; Call for a More Comprehensive Preventive Strategy to Devalue and Dismantle Nuclear Weapons" (11 February 2004), at <http://www.amscontrol.org/pressroom/2004/Bush%20Proliferation%20Proposals.asp?print>, accessed 3/20/04.
[198] Pros/cons taken from Ian Johnstone, Assistant Professor of International Law at the Fletcher School of Law and Diplomacy, in his "International Organizations" class on 28 October 2003, notes in possession of author.

site visits when necessary. Fourth, members could support World Health Organization (WHO) disease monitoring and response mechanisms, establish an international team to provide assistance in the event of an outbreak, and report releases of biological agents. Finally, states-parties should be obligated to legislate "strict regulations for access to particularly dangerous organisms." They could also adopt a code of conduct for microbiologists who study dangerous pathogens, indoctrinate scientists about genetic engineering dangers, and establish biosafety procedures and national oversight of dangerous programs.[199] The United States has recommended that the WHO, Food and Agricultural Organization (FAO), and the World Organization for Animal Health (OIE) would be excellent forums for further formulating guidelines to enact national legislation.[200]

The United States also tabled a proposal to terminate the Ad Hoc Group which had been working on the verification-related protocol. This led the chairman to adjourn the meeting for a year, and later proposals by America and Britain produced adjournment until 2006. In the meantime, the states are meeting annually to discuss measures to incarnate some of the United States' proposals. In 2003 delegates discussed oversight and security of agents; in 2004 they talked about strengthening capabilities to investigate bioweapon use; and in 2005 delegates will discuss standards for scientists.[201] None of these discussions have yet led to legally binding initiatives.

These recommendations and efforts are commendable and will hopefully lead to a more robust regime. At the same time, the problem with instituting an approach based on countries enacting "national legislation" or working from the bottom-up is that not all countries do it. As Jonathan Tucker notes, "Relying exclusively on nationally developed guidelines would result in

[199] Brugger and Boyd, "Briefing Paper."
[200] Tucker, "Preventing."
[201] Brugger and Boyd, "Briefing Paper."

an uneven patchwork of regulations, creating pockets of lax implementation or enforcement. For this reason, any effective campaign to restrict terrorist access to dangerous pathogens will have to be global in scope."[202] Proponents of the "national legislation" approach could argue that it makes no difference—violators will either not enact legislation after signing a protocol or will not do so under multilateral pressure without the international law. This is correct; the difference, however, is that with a protocol, multilateral pressure can appeal to agreed-upon norms enunciated on paper. Proponents can point to a violator's signature and say "you agreed to this." This adds an additional method for procuring compliance from noncompliant states because, as mentioned above, countries generally do not like to be seen as having breached treaty obligations.

IO and Industry Initiatives against Biothreats: A number of international organizations have taken autonomous measures to strengthen the BW nonproliferation regime on both national and international levels. The Organization for Economic Cooperation and Development (OECD) is attempting to establish a global network of "'biological resource centers' (BRCs), defined as government, industry, or academic facilities that house, control, test, or use biological materials."[203] The OECD network is designed to act as a "virtual lending library" to permit microbial exchange among network members. The OECD will establish regulatory guidelines for the network that will be agreed upon by participating governments. In order to enforce compliance, the governments must select an accrediting agency that will perform independent audits to verify good practices.[204] The obvious downside to this initiative is that not all pathogen-owning countries are members of the OECD. Nevertheless, some biosecurity is better than none.

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[202] Tucker, "Preventing."
[203] Ibid.
[204] Ibid.

Other organizations are equally as active. The Group of Seven plus Mexico established in 2001 the Global Health Security Initiative, in which those eight countries are working to agree on uniform standards for pathogen transfers among Biosafety Level 4 laboratories (containing the most dangerous pathogens). In 2002, the Australia Group (a proliferation-conscious group similar to the NSG) added eight toxins of interest to terrorists to its list of prohibited materials. The World Customs Organization is sharing information with Interpol and WHO to combat WMD smuggling. The International Maritime Organization is working on a protocol to "halt shipping of biological agents used for hostile purposes."[205]

The pharmaceutical industry is also taking measures to strengthen the BW nonproliferation regime. In 2002 Interpharma, a Swiss pharmaceutical trade group, adopted a set of best practice guidelines for pharmaceutical companies. As Tucker notes:

> It calls on companies to establish internal regulations and procedures for handling dangerous pathogens, including detailed inventories of materials stored and transferred, transparency in the acquisitions of pathogens and toxins from commercial sources and scientific collaborators, security measures to prevent access by unauthorized individuals, safe transport of biohazardous materials, and treatment of wastes to avoid discharging infectious agents into the environment.[206]

In some senses all of these efforts are heartening. Whereas the NPT and CWC were organized to stop proliferation from the top (organizational level) down, the Biological Weapons Convention seems to be gaining some support from the bottom up since it became clear that an enforcement protocol would not be created. Although a protocol ensuring verification would be helpful, it is hopeful that states will achieve the same results through different means by working on national levels and progressing upward.

Containing the CIS' Biothreat: A number of U.S. and multilateral programs are working to reduce the threat posed by the former Soviet Union's biological weapons programs. Three agencies in America are involved. The Department of Defense runs four programs to fund

[205] Tucker, "Preventing."
[206] Ibid.

civilian research projects and institutes, train scientists in animal care and testing, install security systems, remove weapons-related equipment from production buildings, upgrade diagnostic methods for monitoring facilities, and relocate pathogen libraries to central reference labs.[207] The Department of State funds two initiatives to reconfigure Soviet production facilities for civilian uses and engage weapons scientists in civilian research regarding both pathogens and chemicals. The Energy Department has spent millions on similar programs to employ scientists in commercial projects.[208] As Luongo and his colleagues note, "One of the Energy Department's key strategies is to build infrastructure and capacities in former Soviet facilities in order to allow them to 'graduate' and become self-sustaining commercial enterprises."[209]

Several other multilateral efforts are also working to reduce the CIS' bioweapon threat. The International Science and Technology Center (ISTC) in Russia and the Science and Technology Center of Ukraine (STCU) both provide funding to employ former scientists. Both the United States and European Union have made large contributions to these centers. The EU also established the EU Joint Action and Technical Assistance to the CIS initiative, which beginning with its 2007 budget cycle will make biothreat reduction a high funding priority. Also, the NATO-Russia Joint Scientific and Technological Cooperation program provides grants between $5000 and $20,000 to Russian scientists in biotechnology and other fields.[210]

Luongo and his co-authors posit that six key actions are still needed in order to further ameliorate the threat from the CIS. First, they argue that it is necessary to gain access to Russian Defense Ministry facilities housing biological agents. They recommend that to establish a level of trust necessary to make this possible, the United States and Russia should first

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[207] Luongo et al., "Building a Forward Line."
[208] Ibid.
[209] Ibid.
[210] Ibid.

> agree to a confidential exchange of updated information about former and current (defensively oriented) military facilities. Particular attention should be directed to the existence of any genetically altered pathogens that are resistant to current vaccines. The implications of an accidental release of such a pathogen should transcend rigid adherence to national security secrecy.

Only then, argue the authors, should negotiations about accessing Defense Ministry facilities be re-approached. Second, they recommend better coordination between infrastructure destruction and reemployment opportunities. An example they pose is that the destruction of the Stepnogorsk facility left many scientists out of work; this should be avoided in the future. Third, the authors (with little explanation about how) recommend that greater transparency is needed not only within Russian military installations, but also within the private sphere to ensure no private pathogen manufacturers have malevolent intentions.

Fourth, they note that much effort has been put into funding scientists for biodefense, but more could be allocated for leading scientists to the pharmaceutical industry, with an aim to help solve "global health problems." Fifth, the authors recommend an EU initiative to "concentrate on expanding biosafety and biosecurity upgrades and contributing to the creation of biotechnological parks at critical sites." Finally, Luongo's group believes that greater efforts at improving biosecurity and biosafety best practices are needed not only at Russian sites, but worldwide. They believe doing so will "help to improve their [Russians'] ability to market their capabilities and products to Western commercial partners as well as deepen cooperation, transparency, and trust, potentially leading to progress in other areas."[211] These are excellent recommendations that will hopefully be noticed by policymakers as future plans to strengthen the BW nonproliferation regime are developed and implemented.

Strengthening Biosecurity Standards: In relation to his warning cry about emerging biosecurity threats, Jonathan Tucker also published six thoughtful policy recommendations for

[211] Luongo et al., "Building a Forward Line."

international actors to consider when designing biosecurity policy. Because little has been done by state actors or international organizations in regard to this, his ideas are an excellent place to begin thinking about strengthening global biosecurity standards.

First, Tucker recommends focusing on the "'weakest links'—those states whose research laboratories and culture collections are so poorly secured that terrorists could penetrate them easily"—when considering laboratory security measures. This is wise, considering that safety from the terrorist threat is only as secure as the least secure laboratory. Second, success of security standards will require acceptance by scientists, so guidelines should be developed from the bottom-up with the assistance of the specialists. This proposal is similar to the U.S. recommendation that states work with professional organizations like the WHO and OIE in developing national implementation measures to strengthen the BWC, but it is on a lower level. These consultations would essentially be focused around what measures are needed to ensure laboratory security.

Third, standards should hold enough flexibility "to be tailored to individual research facilities," yet be otherwise specific in goals and implementation. Fourth, states and organizations should focus more on positive incentives rather than punishments in getting others to conform to desired behavior. This is not to say that sticks will never be necessary, but in order to create a culture where scientists and their organizations or governments desire to comply with regulations, positive incentives will bring greater dividends than will threats. Fifth, policymakers should avoid "perverse incentives" when making regulations. An example Tucker gives is requiring so much paperwork from scientists that the scientists instead circumvent rules to get around it. Finally, in order to integrate national regulations with international arms control objectives, states should be careful when formulating biosecurity mechanisms not to "invest in

biotechnologies or procedures that unduly reduce the transparency of biodefense research." At the same time, states have every right to protect their biodefense secrets, so a safe middle ground must be found.[212]

Responding to "The New Biology": Mark Wheelis believes that all of the mechanisms present in his "new biology" could be outlawed through the Biological and Chemical Weapons Conventions, depending on their interpretation. Nevertheless, he notes, states will probably try to develop such capabilities anyway. To guard against this danger, Wheelis supports recommendations already presented in this paper and elsewhere by others, and then suggests one unique proposal. The recommendations he agrees with include making development, possession, or use of such deadly weapons illegal; imposing a single control regime; establishing national systems of review and approval for dangerous experiments (such as the U.S. National Science Advisory Board for Biosecurity); and increasing transparency in defense projects.[213]

Wheelis' singular unique proposal is that, in the face of entirely new uses of biotechnology, "a new convention that would prohibit the nonconsensual manipulation of human physiology" may be needed.[214] This proposal has merit because states have largely not developed these capabilities and because manipulation of physiology has not been addressed in previous conventions. It may be easy to establish norms against "nonconsensual manipulation" while nobody does it. On the other hand, if states feel that these capabilities would enhance their national security or that others may cheat, such a convention would be as difficult to institutionalize as the BWC has been.

[212] Tucker, "Preventing."
[213] Wheelis, "The New Biology."
[214] Ibid.

OPCW Recommendations: Director-General Pfirter, the Review Conference, and various bodies within the OPCW have made a number of cogent recommendations specifically targeted toward strengthening the CW regime:

• In considering measures to "optimi[ze] chemical weapons verification, whilst maintaining the effectiveness of verification activities," the Review Conference recommended that CW-possessor states employ new scientific and technological developments in order to more effectively utilize resources. It also called on the others to help the CW-possessors in this endeavor.[215] The goal of this recommendation is to reduce manpower requirements for verification of weapon destruction because inspectors will be stretched thin as the number of destruction facilities increases over the next few years.

• To make the declaration process simpler for states, Pfirter recommended introducing "nil declarations" for use by those states with nothing to declare.[216] In relation to this, the OPCW's Technical Secretariat provides technical assistance to those states which have had difficulty submitting declarations. In addition, it has undertaken "clarification procedures" wherein it compares declared information with open source data in attempts to identify undeclared facilities.[217]

• The Review Conference called on CWC members that have not yet done so to designate a National Authority and set a deadline whereby states must return and report on their national implementation measures by the next regular session of the Conference. It also encouraged states to "lend advice, upon request" to others that may need help in "drafting and adopting" national implementation measures. Further, the Review Conference prompted the

[215] OPCW, "Review Document," para. 46; and Mathews, "Reviewing the CWC," 110.
[216] Mathews, "Reviewing the CWC," 111; and OPCW, "Note by the Director-General," para. 4.14(a). As Mathews notes (n. 53), there was no consensus from the states on this recommendation.
[217] Mathews, "Reviewing the CWC," 111.

Technical Secretariat to establish networks with regional organizations that could assist states parties in implementing the CWC.[218]

• The Review Conference also emphasized the importance of the "OPCW data bank on protection." Conceived as a mechanism to which states can submit information "concerning various means of protection against chemical weapons," the Review Conference asked the Secretariat to make further strides in establishing the data bank and encouraged states parties to help it do so.[219]

CONCLUSIONS AND RECOMMENDATIONS

It is comforting to note that a number of measures have been recommended and are being implemented in order to strengthen the international nonproliferation regimes. These actions are needed and will help lead us toward a safer international community. Changing the regimes will be necessary for them to stay relevant in a world of imminent threats and preemptive actions. This analysis will conclude with twelve recommendations to help the international community continue on the path to further embed these norms. Some will be targeted at the world's superpower—the United States. Others will require multilateral action. Not all themes and initiatives discussed in this analysis will be addressed below; these are simply what this author considers to be the twelve most important things the world can do to strengthen these regimes.

Recommendations	
1	SCR Outlawing Proliferation
2	Ratify the Additional Protocol
3	Restrict Closed Fuel Cycles
4	Expand PSI Participation
5	Enforce Global Partnership; Expand Nunn-Lugar
6	Enact BWC National Implementation Measures
7	Work with Russia on BW Transparency
8	Strengthen Biosecurity Standards
9	Preempt "The New Biology"
10	Re-evaluate RCA's
11	Ratify the CTBT
12	Take Steps Toward Nuclear Disarmament

Table 3

[218] Mathews, "Reviewing the CWC," 109; and OPCW, "Review Document," para. 83.
[219] OPCW, "Review Document," para. 95.

Recommendation One: Resolution 1540 is a good first step in stopping proliferation of WMD, but more steps can be taken. The Security Council should pass Bush's recommended resolution outlawing the proliferation of WMD altogether. A Security Council resolution would act as a foundation to legitimize (a) the Proliferation Security Initiative, (b) international legal action against would-be proliferators or demanders, and (c) even the use of force—if needed—to stop proliferation. It would "legislate" the norm, as occurred with SC Resolution 1373, in which the Council called on all states to join the fight against terrorism. A SC resolution would be binding on all, not simply those associated with the NPT, and the decisions in the resolution should become national law worldwide. This, of course, will bring the most opposition to the resolution. States will be uncomfortable with the Security Council unilaterally making international law.

Keeping the resolution narrow so it fulfills only one goal—to make illicit WMD proliferation as illegal as the slave trade or piracy—would probably make it possible for the SC to legislate the norm without overwhelming opposition (few will openly disagree that proliferation is a bad thing). The difficulty, of course, will be in defining what is meant by "illicit proliferation." The point of any definition must be to make the exchange of WMD, component parts, or blueprints illegal. Caveats will be necessary for some dual-use items (like HEU exchanged for medical purposes), but it is imperative that a resolution not be weakened by so many caveats that proliferation becomes possible due to excessive systemic loopholes. A resolution should also recognize all the nuclear powers, including Israel, Pakistan, India, and North Korea.[220] Pretending that any of these do not have nuclear weapons would simply undermine the legitimacy of the action.

[220] This is assuming A.Q. Khan's recent assertions of seeing North Korean weapons are true.

The question is whether all five veto-wielding SC members will accede to a call for criminalizing proliferation. Theoretically they all have interests in quelling proliferation—all five are threatened by terrorists or other states which desire to obtain WMD capabilities. On the other hand, China at least is known for its proliferation activities and may oppose such a resolution.

In relation to these other measures, a group of states led by the United States should introduce an amendment to the NPT in which withdrawal will trigger an immediate review by the Security Council. Such an amendment would likely not have trouble passing.

Recommendation Two: The United States Senate should ratify the Additional Protocol. If the United States ratifies this measure, many others will follow. With the Chemical Weapons Convention, a large number of countries held out to see if America would ratify, and once it did, the rest also acceded to the treaty. A similar outpouring of support for the Additional Protocol will probably occur once the United States joins.

Recommendation Three: The world community should pursue Dr. ElBaradei's proposal to restrict closed fuel cycles by placing fuel production under multinational control. This plan would effectively halt the ability to indigenously produce the fuel to make nuclear weapons. He recommended a protocol "that would guarantee access to nuclear technology for health, agriculture, medicine, and power reactors but would restrict plutonium reprocessing and uranium enrichment capabilities."[221]

The world should take a first step of ascertaining what would be meant by "multinational control." For example, in order to implement this, would a new organization be necessary? Could the IAEA administer the program? How much autonomy would states retain? Once these

[221] Arms Control Association, "Arms Control Experts Comment on Bush Nonproliferation Proposals."

issues are addressed, it may become easier to determine the most realistic ways to implement this recommendation while at the same time taking into account national security concerns.

Questions must be addressed regarding how this protocol will relate to those states which already have these capabilities, and what place nuclear-weapon possessing states will take in the system. Establishing such an initiative may ultimately be rejected on national security grounds, but to help avoid such an outcome, caveats could be established so states can know they will not lose nuclear secrets to the international community.

Recommendation Four: The countries participating in the PSI should work to strengthen it by targeting all illicit proliferators, not just North Korea. If a SC resolution is passed, this would not be difficult to do because a resolution would give the legal legitimacy needed to interdict vessels carrying illicit materials, including on the high seas. Further, the United States and others should pursue diplomatic pressures to achieve China's cooperation. Hopefully the concern about North Korean weapons will be enough incentive to acquire China's participation in the measure. If not, perhaps "provisional" Chinese accession could be gained only in relation to stopping proliferation to or from North Korea until further negotiations can be completed.

America should intensify efforts to obtain permission to interdict vessels registered with the remaining four flag-of-convenience states. Economic and political incentives may be necessary, but gaining their cooperation in interdicting illicit materials would make WMD proliferation very difficult on the high seas since so much illicit trade occurs under FOC flags. In addition, the United States should try to reach an agreement whereby not only America, but any PSI member can participate in interdicting a FOC vessel if it is suspected of carrying WMD, with the understanding that FOC countries can do the same to PSI members. Expanding this

agreement to the multilateral level makes it possible to enforce a broader geographic range of implementation.

The greatest obstacles will occur while attempting to gain FOC agreement with the measures because those states may feel uneasy about America and other countries boarding ships with their flags. Because of the importance of the program, however, it is unlikely that any member of PSI would abuse the measure since doing so would hamper PSI activities in the future. In reality, the United States and others may have to worry that FOC states will find false excuses to board PSI member-state vessels. This problem could be addressed by establishing an agreement that no interdiction will occur from either side without the sharing of intelligence first in order to justify the need for interdiction. A mechanism would have to be established, however, by which information can be shared quickly so delays do not hamper the PSI's effectiveness.

Recommendation Five: The United States should embark on first a diplomatic and then (if necessary) a "name and shame" strategy to convince the G8 countries to honor their monetary commitments to the Global Partnership. The United States should also consider increasing funds for the Nunn-Lugar Program on the condition that the money's use can be verified in a transparent enough manner so America will know that it was used as allocated.

Recommendation Six: Washington's proposals for strengthening the BW regime could be very helpful if states will actually adopt the national implementation measures that are called for. The most effective way to do this would be to write a protocol to the BWC that solidifies the measures. No supranational verification mechanism would be necessary at this time (although it would be welcomed), but if states will agree to work from the bottom up on this problem, and will sign their name to a protocol stating so, it would make implementation of these measures

much more likely. Otherwise, after years of conferences on how to strengthen this regime, the world runs a considerable risk that noncompliant states will simply ignore the recommendations. Having countries sign a protocol increases the number of ways to pressure for compliance if states violate their obligations. Therefore, the international community should work to enact a protocol targeted at solidifying Washington's recommendations.

Recommendation Seven: The United States should intensify efforts to work with Russia in dismantling its biological weapons capabilities. Two of the Luongo group's recommendations would be particularly helpful in this regard. First, America should engage in confidence-building measures with Russia (possibly by sharing biodefense information) with a goal of gaining access to the Russian Defense Ministry facilities which house biological agents. Second, the United States should consider increasing funding to lead more Russian scientists to the pharmaceutical industry, both in Russia and elsewhere. Their expertise in microbiology could be helpful in fighting disease.[222]

Recommendation Eight: The international community should enter a discourse to consider strengthening international biosecurity standards. Tucker's recommendations may be helpful here. Research facilities in particular should be targeted because, as mentioned above, the world is only as safe as the least secure laboratory. If nothing else, perhaps the UN Security Council or the parties to the BWC could establish a temporary commission of experts to draft recommended guidelines for increasing biosecurity.

Perhaps more important, the United States, Russia, and others involved in biodefense research should begin establishing transparency mechanisms so that the security associated with their research does not begin a biological arms race. This need not be a prescription for divulging national security secrets. Perhaps it could start with a process as simple as sharing a

[222]Luongo et al., "Building a Forward Line."

list of what biodefense projects are in process or completed. For example, Russia could send the United States a report stating, "We have found a vaccine for X pathogen." It need not divulge how that vaccine was developed. As confidence between partners begins to increase, more substantial actions can be taken with inspectors, mutual cooperation efforts, or other mechanisms. The goal would be to decrease insecurities that the "other guy" is clandestinely developing new bioweapons. These efforts could be employed in concert with those outlined in recommendation seven.

Recommendation Nine: Before "the new biology" becomes a reality that the international community desires to control but cannot, it would be wise for member states of the BWC and CWC to work together on creating international norms to preempt the development of dangerous capabilities. To do so, conferences of parties to both conventions could make declarations stating that unorthodox uses of biology and chemistry (for example, to manipulate genes or create chemically-produced synthetic pathogens) violate the object and purpose of the treaties and should not be pursued by states. The international community should also take seriously Wheelis's recommendation to outlaw the "nonconsensual manipulation of human physiology."[223]

Recommendation Ten: America should lead the way at the OPCW to establish stricter rules concerning the production, storage, and use of agents used for law enforcement and riot control. It may not be necessary to outlaw them altogether. Instead, limits regarding how much can be produced and stored as well as a requirement that any production of these chemicals be declared could be helpful in ameliorating the concern associated with them.

Recommendation Eleven: Possibly most important in relation to nuclear weapons, the Bush Administration should take Congress's rejection of new nuclear programs as an opportunity to reconsider its positions on acquiring new weapons and joining the Comprehensive

[223] Wheelis, "The New Biology."

Test Ban Treaty. Proponents and opponents of the Administration's position on these issues both have valid, understandable arguments. The question is whether the United States gains more security by taking action that makes deadly technology less desirable to others, or whether it will do so by increasing its deterrent capabilities. It is well established that deterrence does not work against terrorists, so the policies are generally targeted against states. A nuclear bunker buster could be used against terrorist leadership or underground biological stockpiles, but questions remain—are the pros of having it outweighing the cons, and would the United States be willing to accept the international backlash from the use of a nuclear weapon against the territory of a state, regardless of whether that weapon was targeted at terrorists? This is a debate that will not be resolved here, but it can be argued that in order to obtain the final recommendation—pursuing disarmament—the United States will have to change its policies on these issues before others will do so. It is therefore recommended that the United States cease research into weapon upgrades and become a proponent of the CTBT. America should both ratify that convention and use all of its diplomatic weight to pursue accession by the remaining eleven necessary parties. If it becomes vitally essential in the future, America can always withdraw from the treaty.

Recommendation Twelve: The international community should attempt multilateral steps toward near-complete nuclear disarmament. As this analysis mentions above, a serious weakness of the nuclear nonproliferation regime is the insecurity states feel and their desire to obtain nuclear weapons. Disarmament would change this, and therefore I will propose one brief framework in which nuclear disarmament could occur.

The United States should partner with Russia to begin a "Positive Spiral of Disarmament." It would work in the following manner: Russia has approximately 20,000

nuclear warheads and the United States owns about half that amount. The two would partner together and agree that Russia will verifiably[224] reduce its arsenal of warheads to equal the U.S. amount. Serious sticks and carrots will be necessary, but the promise of the process's continuation may help convince Russia to concede. If Russia will agree to the measure, the next step is to have both Russia and the United States consent to reduce their warhead numbers to that of China—410. Then they would approach China and partner with it to decrease warhead numbers to the level of the next lowest holder—France (with 348). The process would continue with the growing group disarming to lower thresholds until they reach Pakistan, with 50 weapons.[225] At this point they could decide to continue, engage Pakistan, and totally disarm, or to each retain 50 warheads as a deterrent capability, which it would indeed be.[226] The process would need to include measures of transparency and verifiability, possibly a new organization to oversee monitoring, and massive funds contributed by all.

The pros of this option are that (a) once the initial stage is passed, international pressure will build for each new negotiation to take place. (b) If at any stage one of the actors decides not to participate, the remaining actors are no less secure than they were or at least are not less secure than their most heavily-armed counterpart. (c) If states decide to retain an ultimate capability, they can have it, but it will be at a manageable level—50 warheads.

The cons of this proposition are that (a) convincing Russia to take the initial step may be extremely difficult. (b) If Kenneth Waltz is correct, disarmament may lead to increased

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[224] The issue of verification in itself opens debate, especially when discussions emerge concerning how to verify a given action. That debate is the subject of another paper—in this survey I will assert that if verification is possible, it should be used.

[225] Numbers from Joseph Cirincione, Jon B. Wolfsthal and Miriam Rajkumar, *Deadly Arsenals: Tracking Weapons of Mass Destruction* (Washington, D.C.: Carnegie Endowment for International Peace, 2002), map attachment.

[226] As more information emerges concerning North Korean weapons, North Korea may need to be made the bottom of the totem pole, unless states who want to retain a minimal deterrent capability feel that two or three weapons may not be enough, but 50 would be.

conventional conflict as states no longer fear mass destruction from enemies.[227] (c) This option would make missile defense very attractive for all states if a few missiles are retained; if all gain missile defense, a new arms race may begin in order to keep a deterrent capability. (d) A state or group may clandestinely retain weapons to be used as instruments of blackmail or deterrence at a later time.

This recommendation may be impossible to implement, for the cons represent definitive obstacles to be overcome; and in reality, states may not wish to disarm. If it is untenable, the international community would still be wise to capitalize on the momentum that has been building toward strengthening the nuclear, biological, and chemical weapons nonproliferation regimes and should pursue the other eleven recommendations outlined above. If nothing else, these would move these regimes closer to the enforcement stage and may make effective nonproliferation a viable goal in the future.

[227] For an exposition of Waltz's position, see Scott D. Sagan and Kenneth N. Waltz, *The Spread of Nuclear Weapons: A Debate* 2d ed., (New York/London: W.W. Norton, 2002/2003).

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