

COUNTERPROLIFERATION OF NUCLEAR WEAPONS

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ABSTRACT

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The proliferation of nuclear weapons remains a significant security challenge to the United States of America. The combination of global terrorism combined with the spread of nuclear weapons poses an especially unnerving combination of threats. Non-proliferation policies and goals remain an important part of the nation's strategy in this new environment. Furthermore, the United States must employ a diplomacy led approach to contain the spread of nuclear weapons and maintain an appropriate counterproliferation capacity. This essay uses a historical review of the proliferation of nuclear weapons to identify trends that result in nuclear proliferation. Additionally, it looks at the awareness following the 9/11 attacks of a possible vulnerability resulting from the combination of terrorism and nuclear weapons. Likewise, it explores three case studies that present successful counterproliferation operations to identify and evaluate a spectrum of possible future counterproliferation measures. Finally, following a review of current national policy, the essay presents recommendations to improve the Obama administration's approach to non-proliferation and counterproliferation issues.

COUNTERPROLIFERATION OF NUCLEAR WEAPONS

The United States ushered in the age of nuclear warfare with the first man-made nuclear explosion on July 16, 1945 in the deserts of New Mexico¹ and the subsequent wartime nuclear destruction of the Japanese cities of Hiroshima and Nagasaki in August, 1945. Since the attacks on Japan, many nations have sought to join the elite club of nations possessing nuclear weapons. Starting its own nuclear weapons program immediately after the attacks on Japan, America's utmost competitor, the Union of Soviet Socialist Republics exploded its first nuclear weapon on 29 August 1949²--only four years after the nuclear weapons attacks against Japan brought World War II to an end. With the Soviet explosion, the era of the United States' nuclear monopoly came to a dramatic end, and since that time, the world has had to contend with a possibility of a devastating nuclear war between nations.

After the Soviet Union's nuclear test, Britain, France, and China soon followed suit. Thereafter, the world attempted to contain the spread of nuclear weapons with the signing of the Treaty on Non-Proliferation of Nuclear Weapons in 1968. Unfortunately, after the international community implemented the Non-Proliferation Treaty (NPT) protocols, India, Pakistan, Israel (not acknowledged), South Africa, and North Korea all created nuclear weapons contrary to international law. In addition, Iraq and Libya attempted to establish illicit nuclear programs, but the international community turned the efforts of these states back using a variety of counterproliferation means. Today, Iran continues to pursue nuclear weapons technology. Moreover, many other countries with legitimate peaceful nuclear programs maintain the capacity to become a nuclear-armed state in short order.

The destruction of the World Trade Center towers during the attacks on September 11, 2001, demonstrated the extreme levels of violence terrorists are willing to employ to achieve their goals. This attack, combined with the relentless pursuit of nuclear weapons by rogue states and the creeping spread of nuclear weapons to unstable regimes, convinced the United States and much of the international community that the world must now contend with the previously implausible danger of nuclear-armed terrorist groups as a real possibility. In Prague, in April, 2009--almost eight years after the terrorist attacks in New York--President Obama warned of the danger that nuclear proliferation combined with terrorism may pose:

...In a strange turn of history, the threat of global nuclear war has gone down, but the risk of a nuclear attack has gone up. More nations have acquired these weapons. Testing has continued. Black market trade in nuclear secrets and nuclear materials abound. The technology to build a bomb has spread. Terrorists are determined to buy, build or steal one. Our efforts to contain these dangers are centered on a global non-proliferation regime, but as more people and nations break the rules, we could reach the point where the center cannot hold.³

As history demonstrates, the number of nations possessing nuclear weapons steadily increases in spite of the NPT and the concentrated effort of the United States' diplomatic efforts. With the growing number of potentially unstable nuclear-armed states and a real possibility of nuclear-armed terrorist groups, the United States must focus its instruments of national power to enhance its non-proliferation efforts and counterproliferation capacity.

This essay will review the history of the proliferation of nuclear weapons to understand the manner in which nuclear technology has spread and identify potential trends to focus our non-proliferation efforts. Next, it will explore the impact the terrorist attacks on September 11, 2001 have had on the United States' awareness of a possibly

devastating vulnerability and the consequent reinvigorated focus on the dangers of nuclear proliferation. Likewise, it reviews three case studies that present successful counterproliferation operations to identify and evaluate a spectrum of possible future counterproliferation measures. Finally, following a review of current national policy, it will provide recommendations that President Obama's administration could implement to meet immediate and future non-proliferation challenges while simultaneously maintaining required counterproliferation capacity to defend the United States and our allies against a growing nuclear threat.

Trinity and Hiroshima

...it may become possible to set up nuclear chain reactions in a large mass of uranium, by which vast amounts of power and large quantities of new radium-like elements would be generated. Now it appears almost certain that this could be achieved in the immediate future.

This new phenomenon would also lead to the construction of new bombs, and it is conceivable—though much less certain—that extremely powerful bombs of a new type may thus be constructed. A single bomb of this type, carried by boat or exploded in a port, might very well destroy the whole port together with some of the surrounding territory. However, such bombs might very well prove too heavy for transportation by air.⁴

At the urging of Hungarian physicist Leo Szilard, Albert Einstein signed a letter addressed to President Franklin Roosevelt on August 2, 1939 indicating that it may be possible to create an atomic bomb. After President Roosevelt received Einstein's letter, he created the Advisory Commission on Uranium.⁵ Roosevelt later morphed the Advisory Commission into a nuclear weapons program in 1941 and renamed the program the Manhattan Project in 1942.⁶ The mammoth efforts of the Manhattan Project resulted in the first man-made nuclear explosion producing a measured yield of 18.6 kilotons on July 16, 1945 in the deserts of New Mexico.⁷ Otto Frisch, a nuclear physicist, described the explosion as a small sun too bright to look at which had grown

and dimmed into something more like a huge oil fire and as it cooled one could see a blue glow around it—followed by a bang minutes later.⁸ The United States of America had created the nuclear age and in so doing, become the world's first nuclear power.

When the Japanese rejected the Potsdam ultimatum, President Truman decided to use the atomic bomb on Japan.⁹ The first nuclear target became the city of Hiroshima. Early in the morning on August 6, 1945, the *Enola Gay*, loaded with a single atomic bomb, took off from its base in the Mariana Islands towards Japan. At 0816, the bomb was dropped over the city and exploded with an explosive yield of 12.5 kilotons of TNT. For the inhabitants of Hiroshima, the “surprise and shock were absolute.”¹⁰ Much of their city was destroyed with a bright flash of light, searing heat, and an incredible blast wave. A large number of people were instantly incinerated and fires ignited much of the city. Hours later, radioactive fallout rained on the survivors. In a few seconds, a single aircraft carrying a single bomb destroyed Hiroshima, killing or mortally wounding up to 130,000 Japanese.¹¹

While the scientists of the Manhattan Project were awestruck at the first nuclear blast in New Mexico, the world bore witness to the total devastation that a single nuclear weapon could achieve at Hiroshima. From this point forward, the tremendous hazards to civilization resulting from a potential nuclear war were universally understood.

The Spread of Nuclear Weapons and the NPT

Following Hiroshima, nuclear weapons technology spread over the next twenty years to an elite club of nations – the United States, the Union of Soviet Socialist Republics, the United Kingdom, the Republic of France, and the People's Republic of China. Nuclear proliferation over this period came about via a combination of internal

technological capacity, espionage, and the deliberate sharing of nuclear technology and scientific knowledge.

The Soviet Union developed nuclear weapons next. While Joseph Stalin had ordered a small nuclear pilot project begun in 1942, it took Hiroshima to spur him to urgent action. “A single demand of you, comrades,” he said to the officials involved in the Soviet effort, “provide us with atomic weapons in the shortest possible time. You know Hiroshima has shaken the whole world. The balance has been destroyed. Provide the bomb – it will remove great danger for us.”¹² Klaus Fuchs and Theodore Hall, two scientists on the Manhattan Project, had been previously recruited to spy for the Soviets and provided the USSR with an accurate description of the Fat Man before Hiroshima.¹³ In an effort to speed bomb development and appease Joseph Stalin, Lavrenti Beria, the head of the crash Soviet program directed his scientists to build an “exact copy of the American bomb” with the information provided by Fuchs.¹⁴ The information Fuchs provided might have saved the Soviets a couple of years, but the scientific and technical ability of the Soviet scientists, combined with their tremendous effort, almost guaranteed success.¹⁵ The efforts of Stalin’s scientists enabled the Soviet Union to explode its first nuclear weapon on August 29, 1949¹⁶--only four years after the US nuclear weapons attacks against Japan ended World War II.

Since British scientists had collaborated with the American nuclear weapon development program during World War II, Britain was able to develop its first atomic bomb with internally developed capacity and some material aid from Canada. Great Britain made the decision to begin development of a nuclear weapon in 1947. The British used plutonium produced in a reactor in England and augmented their

insufficient supply with additional plutonium obtained from Canada. The British conducted their first nuclear test off northwest Australia in the Monte Bello Islands on October 3, 1952.¹⁷

On December 26, 1954, the government of France made the decision to develop nuclear weapons with the Prime Minister's declaration that "The guidance of strategy will henceforth increasingly belong to powers that have the atomic weapon."¹⁸ French President De Gaulle believed that an atomic weapon was "symbolic of French greatness."¹⁹ France tested its first atomic bomb in Algeria at Reggane on February 13, 1960.²⁰

China was the last of the initial powers to enter the nuclear club. Like France, Mao had sought nuclear weapons because of their association with the great powers. China wished to take advantage of its alliance with the Soviet Union to become a nuclear power; however, the Soviets declined to provide nuclear weapons to China. Yet, for several years they did assist Chinese scientists to develop indigenous capacity.²¹ Soviet nuclear cooperation with China ended in 1960 because of growing disputes between the two nations, but China's internal nuclear research continued and she exploded her first atomic bomb at the Lop Nor test site on October 16, 1964.²² With this explosion, the last internationally sanctioned atomic power joined the elite members of the nuclear-weapons states club. Each of these states could trace the roots of their nuclear weapons program to their internal technological and industrial capacity, espionage, outside assistance, and information developed during the US Manhattan Project.

When the initial members of the nuclear club recognized that their security would benefit if no additional nations developed nuclear weapons, the NPT came into being.²³ Designed to prevent the further spread of nuclear weapons, the NPT opened for signature in 1968 and included provisions for nuclear non-proliferation, nuclear disarmament, and an affirmation of the right to pursue nuclear technology for peaceful uses.²⁴ All nations have signed or acceded to the treaty with the exception of Israel, India, and Pakistan. North Korea withdrew from the treaty in 2003.²⁵

Illicit Nuclear Weapons Programs Since the NPT

The NPT treaty has not proven effective in stopping the spread of nuclear weapons. Despite the implementation of the NPT, five nations have developed a nuclear weapons program and at least three additional nations have attempted to develop or currently are developing an illicit nuclear weapons program. In most cases, these countries decided to develop nuclear weapons to satisfy their own perceived security concerns or to gain the associated international prestige that accompanies entry into the nuclear club. The common start point in each of these examples is the establishment of peaceful nuclear technology programs authorized, but insufficiently controlled, by the NPT. In addition, the combination of either sufficient indigenous technological capacity or illicit technology transfers from other nuclear-weapons states with the peaceful nuclear program contributed significantly to nuclear proliferation.

Israel, India, Pakistan, South Africa, and North Korea have all become nuclear-armed states contrary to the NPT. Mordechai Vanunu, a nuclear technician who worked at the Israeli reactor that was developed with aid from France, revealed evidence of the Israeli nuclear weapons program to the world in 1985.²⁶ India's first nuclear reactor was built with aid from both Canada and the United States,²⁷ and India

tested its first nuclear device in 1974.²⁸ Pakistan's nuclear program was led by its chief nuclear scientist, A.Q. Khan with limited assistance by China. Khan established a worldwide network of suppliers including suppliers from Germany and elsewhere in Europe. Following Indian nuclear tests in 1998, Pakistan conducted its first nuclear tests.²⁹ The South Africans constructed a nuclear reactor with French assistance, and the Israelis may have provided assistance in technology, possibly in exchange for uranium from South Africa.³⁰ South Africa gave up its nuclear weapons in 1989.³¹ Finally, the Soviet Union built North Korea's initial Yongbyon reactor in 1965.³² North Korea conducted a partially successful nuclear test in 2006 followed by a successful second test in 2009. In each of these cases, the weapons programs of these nations started with nuclear powers providing aid to peaceful nuclear programs within the bounds of the NPT.

Iraq, Libya, and Iran also have attempted, unsuccessfully thus far, to develop nuclear weapons programs. Iraq received aid from the Soviet Union in 1968,³³ and the French started construction of the Osiraq reactor near Baghdad in 1976.³⁴ Though suffering a number of setbacks, Saddam Hussein's deceit about Iraq's nuclear program eventually led to the United States decision to invade Iraq to eliminate any programs for weapons of mass destruction (WMD). In 2003, President Qaddafi unexpectedly publically announced the existence of Libya's WMD program and agreed to dismantle his nuclear weapons program.³⁵ Lastly, Iran has had a decades-long nuclear program with American, French, German, Russian, Chinese, and Pakistani aid.³⁶ Ominously, the *New York Times* reported that the International Atomic Energy Agency released a report

on February 18, 2010, which concluded that Iran continues to work towards the development of nuclear weapons.³⁷

The above case studies clearly implicate existing nuclear-weapons powers in the proliferation of nuclear technology. These examples also highlight shortcomings in the current NPT. The international community could modify the NPT clause providing the right to peaceful nuclear technology to reduce the likelihood of the proliferation of nuclear weapons.

9/11 and the Threat of Nuclear Terrorism

The 9/11 terrorist attacks on the World Trade Center towers greatly increased the concern in the international community about the possibility of a nuclear-armed terrorist organization. Al Qaeda, led by Osama bin Laden, has expressed a desire to acquire weapons of mass destruction, including nuclear weapons, to conduct spectacular attacks against western nations. In their opinion article, “Bin Laden and the Bomb,” contained in the *Bulletin of the Atomic Scientists*, January/February 2002, David Albright, Kathryn Buehler and Holly Higgins point out that Al Qaeda attempted to purchase highly enriched uranium in the mid-1990s and also state that Osama bin Laden has expressed a desire for nuclear weapons.³⁸ The public version of the United States 9/11 Commission Report, released in July 2004, details one scheme where Al Qaeda agents attempted to buy weapons grade uranium with the explanation, “It’s easier to kill more people with uranium.”³⁹ The same report indicated Osama bin Laden intended to carry out a “Hiroshima” and noted that George J. Tenet, the Director of the Central Intelligence Agency, included in the public portion of the February 2004 Worldwide Threat Assessment a warning that Al Qaeda “continues to pursue its strategic goal of obtaining a nuclear capability.”⁴⁰

While Osama bin Laden may seek nuclear weapons, developing or acquiring such weapons may prove a formidable task. Constructing a nuclear weapon is not an easy task, even for a country with sufficient resources, scientific expertise, and industrial capacity. The Silberman-Robb Commission on Intelligence further commented on the challenge of constructing a nuclear weapon with the statement that “simply because a state can buy the parts does not mean it can put them together and make them work.”⁴¹ Osama bin Laden’s best chance may in fact lie in the unlikely hope that a rogue nuclear power may actually transfer a nuclear weapon to his organization. Such nations, however, have much to lose and little to gain from a transfer of a nuclear weapon to a terrorist organization over which they may have little control.

While the likelihood of such an attack may be low, the disastrous results of a nuclear terrorist attack demands we take the threat seriously and work diligently to prevent such an occurrence. In his book, *Atomic Tragedy*, Sean Malloy writes that Henry Stimson, the United States Secretary of War, warned in April, 1945 that “the future may see a time when such a weapon may be constructed in secret and used suddenly and effectively with devastating power by a willful nation or group against an unsuspecting nation or group of much greater size and material power.”⁴² Stimson’s warning is eerily prescient and takes on added significance in the wake of the 9/11 terrorist attacks. The United States must continue to work with the international community to prevent terrorist organizations from acquiring nuclear weapons.

Counterproliferation Historical Vignettes

There are a number of instances where the international community has taken action to turn back or block the spread of nuclear weapons. The following three vignettes—the 1962 Cuban Missile Crisis, the 1981 Israeli strike against Iraq, and the

2003 Invasion of Iraq--demonstrate the spectrum of counterproliferation actions that may be useful to block the spread of nuclear weapons.

Blockade–1962 Cuban Missile Crisis. During the October 1962 Cuban Missile Crisis between the United States and the Soviet Union, President Kennedy imposed a naval ‘quarantine’ on shipments of weapons to Cuba. The quarantine deployed the military to action to demonstrate American determination and simultaneously avoided armed conflict between the Russians and the United States, which certainly would have provoked an escalated Soviet military response. The quarantine proved sufficient to preclude additional missile shipments to Cuba and provided time to develop a diplomatic solution to the crisis without unintentionally precipitating war between the nations.⁴³ This vignette demonstrates the success possible when diplomatic action is combined with non-kinetic military action to stop the spread of nuclear weapons.

Pre-Emptive Strike–1981 Israel strike against Iraq. Iraq purchased the Osiraq nuclear reactor from France in 1976. The purchase of the reactor would give Iraq internal capacity to produce plutonium that could potentially be used to develop nuclear weapons. Israel took action to eliminate the reactor as a possible threat. On June 7, 1981, the Israeli Air Force conducted an air strike to destroy the reactor before it could become operational.⁴⁴ Israel’s strike provided a temporary obstacle to Saddam Hussein’s nuclear ambitions. In fact, Israel’s strike may have strengthened Saddam’s resolve to acquire nuclear weapons, and during the Iran-Iraq war of the 1980’s, Saddam restarted his nuclear program with renewed determination.

Regime Change–2003 Coalition Invasion of Iraq. Early in his administration, President George W. Bush made a decision to invade Iraq and effect regime change.

His decision was in part due to Saddam Hussein's continued recalcitrance towards the International Atomic Energy Agency inspectors who were attempting to validate compliance with United Nations resolutions on WMD. In March of 2003, a small coalition, led by the United States, invaded Iraq and brought down Saddam's regime in a matter of weeks. Coalition forces confirmed the absence of an active nuclear weapons program, but the invasion led to a costly counterinsurgency effort to provide conditions necessary to stabilize Iraq under new Iraqi leadership chosen by the citizens of Iraq. With the invasion, the United States lost much in international prestige, engaged in a costly war lasting more than seven years, and suffered a large number of casualties in the war. Regime change has proven an expensive counterproliferation option.

A number of lessons can be derived from these three case studies. First, pre-emptive strikes may delay a nuclear weapons program, but may be insufficient to eliminate a nuclear program without continued strikes. Second, at great cost, war to effect regime change may prove an effective counterproliferation option. Finally, the nation is most effective when diplomatic action is combined with non-kinetic military action to contain the spread of nuclear weapons.

Current United States National Non-Proliferation Policy

The United States has maintained the policy of non-proliferation of nuclear weapons since the beginning of the nuclear age. After the Chinese joined the nuclear club with a test in 1964, the United States was instrumental in leading the world to the NPT in 1968. The most recent *National Defense Strategy* (NDS), written during the George W. Bush administration, reiterates non-proliferation as an objective of national

defense. Presently, President Obama and members of his administration have maintained the policy of non-proliferation as a United States priority security objective.

National Defense Strategy. The NDS states that there are few greater challenges than those posed by chemical, biological and nuclear weapons. The NDS indicates the United States prefers to use non-military means to counter the spread of weapons of mass destruction, but affirms that the United States will exercise its right of self-defense to prevent hostile acts by our adversaries. Moreover, the NDS argues that by limiting the number of states that can directly threaten the United States and simultaneously dissuading the possible transfer of weapons to non-state actors, the United States will deny terrorists a potent weapon and reduce risk to America. Finally, the NDS states that it is in our interests to prevent hostile or potentially hostile states from acquiring or proliferating WMD and the means to deliver them.⁴⁵

President Obama's Policy. Focusing worldwide attention to the challenges of non-proliferation, in his remarks in Prague on April 5, 2009, President Obama noted:

...One nuclear weapon exploded in one city—be it New York or Moscow, Islamabad or Mumbai, Tokyo or Tel Aviv, Paris or Prague—could kill hundreds of thousands of people. And no matter where it happens, there is no end to what the consequences might be—for our global safety, our security, our society, our economy, to our ultimate survival.⁴⁶

While this was the first occasion where President Obama specifically addressed the threat of nuclear attack in a policy statement, his administration has since continued to reinforce the message at the United Nations and elsewhere.

Reinforcing President Obama's message in her October 21, 2009 speech to the United States Institute of Peace, Secretary of State Hillary Clinton reminded us that current nuclear proliferation challenges are daunting. She readily pointed to North Korea's unsanctioned nuclear weapons development and Iran's continued nuclear fuel

enrichment activities as examples of current challenges. She further reminded the audience that illicit networks, both state and non-state, are engaging in sensitive nuclear trade and are actively working around laws designed to guard against the trade of nuclear materials and technology. Secretary Clinton noted that stocks of nuclear materials remain vulnerable to theft and possible illicit transfer to unauthorized agents. Secretary Clinton concluded that unless the proliferation challenges are reversed soon, the world would be host to a growing number of nuclear-armed states with an ever-increasing risk of terrorists gaining nuclear weapons.⁴⁷

Secretary Clinton also restated current United States policy and emphasized the soundness of the current NPT. She outlined the United States' plan to supplement the NPT, including confronting nuclear proliferators; increasing the capacity of the IAEA to ensure all nations abide by the NPT; negotiating a new treaty with Russia to reduce nuclear arsenals; seeking ratification of the Comprehensive Test Ban Treaty (CTBT) and a Fissile Material Cutoff Treaty (FMCT); reviewing the role of nuclear weapons in the United States' defense strategy; and establishing budgetary priorities that guarantee the safety and effectiveness of our nuclear deterrent.⁴⁸ Addressing immediate proliferation threats in her statement, Secretary Clinton asserted, "Thwarting the nuclear ambitions of North Korea and Iran is critical to shoring up the nonproliferation regime."⁴⁹

Is the United States policy emphasizing non-proliferation of nuclear weapons the correct choice? In the book, *The Spread of Nuclear Weapons: a Debate Renewed*, Kenneth Waltz argues that the spread of nuclear weapons may increase security in the World, "more may be better." He states "the likelihood of war decreases as deterrent and defensive capabilities increase. Nuclear weapons make wars hard to start. These

statements hold for small as for big powers. Because they do, the gradual spread of nuclear weapons is more to be welcomed than feared.”⁵⁰ Waltz lists three reasons for his belief: “International politics is a self help system where the nations determine their own fate, the fate of other nations, and the fate of the system”; “Nuclear weaponry makes miscalculation difficult because it is hard not to be aware of how much damage a small number of warheads can do”; and that “new nuclear states will feel the constraints that present nuclear states have experienced.”⁵¹

Waltz’s co-author, Scott Sagan counters with a point that “nuclear proliferation optimists have confused prescriptions of what rational states should do with predictions of what real states will do.”⁵² Moreover, Sagan somberly reminds us that “A world with more nuclear armed states may be our fate; it should not be our goal.”⁵³

The spread of nuclear weapons to rogue states or the transfer of nuclear weapons to terrorists or other non-state actors will place the citizens of the United States and our allies at increased risk. President Obama has chosen to work with the international community to minimize this risk with a robust non-proliferation policy.

United States Counterproliferation/Non-Proliferation Efforts

So what actions should the United States take to implement its non-proliferation policy? As demonstrated earlier, a combined approach using the diplomatic and military instruments of national power is most effective. Secretary of State Hillary Clinton outlined the administration’s plan in her address to the United States Institute of Peace, but this essay will provide additional recommendations as necessary to enhance the plan.

Diplomacy. Secretary Clinton stated the United States wished to supplement the NPT to increase the protocol's effectiveness. She specifically pointed out that the United States wished to increase the capacity of the IAEA to ensure all nations abide by the NPT.⁵⁴ In addition, our review of the historical proliferation of nuclear weapons revealed a trend that the right to nuclear technology for peaceful purposes currently permitted in the NPT is often abused and serves as the start point for a state's nuclear weapons program. The United States must demand that the international community include effective controls for the elements of the peaceful nuclear fuel cycle to reduce the likelihood that enriched fuel can serve as a catalyst for a nuclear weapons program.

Secretary Clinton also highlighted the United States' efforts to negotiate a new treaty with Russia to reduce nuclear arsenals. This effort demonstrates US resolve to abide by the NPT and is important to show good will towards the international community. Additionally, the US and Russia must also work with the other NPT sanctioned nuclear-armed states, the United Kingdom, France, and China, to reduce their nuclear stockpiles as well. It is important for the international community to see the "Great States" turning away from nuclear weapons.

In addition, Secretary Clinton stated the administration would seek ratification of the FMCT and CTBT. The FMCT would support the goal to implement additional controls on the elements of the nuclear fuel cycle. Moreover, while denying the United States the ability to test new nuclear warheads to maintain an effective deterrent force, the CTBT would also limit the other nuclear states' ability to test their weapons as well. Furthermore, the CTBT would increase the difficulties for a new nuclear power attempting to verify a nuclear design and demonstrate their entry into the nuclear club.

Next, the administration must continue to emphasize the utility of the Proliferation Security Initiative (PSI) as a means to muster voluntary international participation in non-proliferation activities and authorization to search vessels illicitly transporting components of weapons of mass destruction or delivery mechanisms. International law must be changed to declare these activities illegal to improve the effectiveness of this program.

Finally, the option of robust economic sanctions must remain an option to challenge the illicit behavior of a state and the administration must conduct diplomacy to garner support for a strong sanctions regime. Though economic sanctions have rarely compelled an adversary to deviate from a particular course of action, they do significantly increase the cost of pursuing nuclear weapons and might dissuade some states from pursuing nuclear weapons in the future because of the added expense.

Military. The Department of Defense has a wide variety of capabilities that support counterproliferation, but they require continued investment to remain relevant. The nuclear deterrence provided by the United States conventional and nuclear forces plays a critical role in securing the United States against nuclear attack. Moreover, the capacity to attribute a nuclear blast to a specific source of fissile material or country is an essential element to enhance the deterrence effect. Nations with nuclear arsenals must understand that the United States maintains a credible force with the ability to effect regime change or to destroy their nation if their nuclear weapons or materials are used in an attack against the United States or our allies.

In addition, the United States must maintain dominant conventional forces that are unmatched. The Navy, with possible allied partners, must retain the ability to

execute a blockade to intercept and inspect vessels suspected of containing prohibited technology or materials entering or leaving ports from nations that persist in the proliferation of nuclear weapons. Moreover, the US must maintain the ability to conduct global strikes to destroy nuclear facilities in nations that develop illicit nuclear programs. Deep penetration munitions designed to destroy hardened targets are an essential component of this capacity. Finally, in extreme circumstances, our conventional forces must retain the capacity to conduct offensive operations to remove regimes that persist in defying the international community to develop nuclear weapons.

Conclusion

The world has understood the dangers of nuclear war since Hiroshima and lived under the shadow of possible nuclear war during the Cold War. Now, the 9/11 attacks, combined with the steady spread of nuclear weapons to rogue states, brought to light the possibility that the transfer of nuclear weapons to terrorists or other non-state actors might ultimately place the citizens of the United States or our allies at increased risk.

The Obama administration has accepted this challenge and is working energetically in a diplomacy led approach to mitigate the risk of nuclear proliferation. While many of their policies will prove effective, there are additional actions that are necessary to provide the most benefit. These recommendations include: establishing positive controls over all elements of the peaceful nuclear energy cycle in an update to the NPT; work with the other NPT sanctioned nuclear-armed states, the United Kingdom, France, and China, to reduce nuclear stockpiles in conjunction with the decrease with Russia; change international law to criminalize the illicit transport of weapons of mass destruction or their components to enhance the effectiveness of the PSI; continue to invest in the nuclear and conventional military forces of the United

States to provide credible deterrence; and finally, develop the capacity to ensure the ability to attribute a nuclear explosion to a fissile material source and country. These actions, when combined with other initiatives of President Obama's administration, will significantly mitigate the risk of a potentially devastating nuclear attack against the United States or our allies.

Endnotes

¹Gerard J. DeGroot, *The Bomb: a Life*, (Cambridge, MA: Harvard University Press, 2005), 62.

²*Ibid.*, 145.

³*The White House Home Page*, http://www.whitehouse.gov/the_press_office/Remarks-By-President-Barack-Obama-In-Prague-As-Delivered (accessed January 15, 2010).

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⁵DeGroot, *The Bomb: a Life*, 23.

⁶*Ibid.*, 28-32.

⁷*Ibid.*, 62.

⁸*Ibid.*, 61.

⁹*Ibid.*, 80-81.

¹⁰Peter R. Beckman et al., *Nuclear Weapons, Nuclear States, and Terrorism*, 4th Ed. (Cornwall-on-Hudson, NY: Sloan Publishing, 2007), 1.

¹¹*Ibid.*

¹²*Ibid.*, 38.

¹³DeGroot, *The Bomb: a Life*, 80.

¹⁴*Ibid.*, 135.

¹⁵Jeremy Bernstein, *Nuclear Weapons: What You Need to Know* (New York: Cambridge University Press, 2008), 213.

¹⁶DeGroot, *The Bomb: a Life*, 145.

- ¹⁷ Ibid., 219-220.
- ¹⁸ Ibid., 233.
- ¹⁹ Ibid., 234.
- ²⁰ Ibid., 232-234.
- ²¹ Beckman et al., *Nuclear Weapons, Nuclear States, and Terrorism*, 4th Ed., 39.
- ²² DeGroot, *The Bomb: a Life*, 266.
- ²³ Beckman et al., *Nuclear Weapons, Nuclear States, and Terrorism*, 4th Ed., 143.
- ²⁴ *The United Nations Home Page: The Treaty on the Non-Proliferation of Nuclear Weapons*, <http://www.un.org/events/npt2005/npttreaty.html> (Accessed January 3, 2010).
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- ²⁷ DeGroot, *The Bomb: a Life*, 316.
- ²⁸ Ibid., 174.
- ²⁹ Ibid., 345.
- ³⁰ Ibid., 316.
- ³¹ Ibid., 325.
- ³² James Clay Moltz and Alexandre Y. Mansourov, eds, *The North Korean Nuclear Program: Security, Strategy, and New Perspectives from Russia* (New York: Routledge Publishing, 2000), 15-17.
- ³³ Anthony H. Cordesman, *Weapons of Mass Destruction in the Middle East* (United Kingdom: Brassey's, 1991), 95.
- ³⁴ Ibid., 349.
- ³⁵ John Mueller, *Atomic Obsession: Nuclear Alarmism from Hiroshima to Al-Qaeda* (New York: Oxford University Press, 2010), 126.
- ³⁶ Zehra Nilufer Karacasulu and Irem Askar Karakir, "Attitudes of the International Community toward Iran's Nuclear Puzzle," *Journal of International and Area Studies*, 15, no. 2, (December 2008): 4, in ProQuest (accessed February 7, 2010).

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⁴¹ *Ibid.*

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⁴⁴ Cordesman, *Weapons of Mass Destruction in the Middle East*, 96-97.

⁴⁵ Robert M. Gates, *National Defense Strategy* (Washington, DC: US Government Printing Office), 14-15, <http://www.defense.gov/news/2008%20National%20Defense%20Strategy.pdf> (accessed November 10, 2010).

⁴⁶ *The White House Home Page*, http://www.whitehouse.gov/the_press_office/Remarks-By-President-Barack-Obama-In-Prague-As-Delivered (accessed January 15, 2010).

⁴⁷ *The State Department Web Site*, <http://www.state.gov/secretary/rm/2009a/10/130806.htm> (accessed January 18, 2010).

⁴⁸ *Ibid.*

⁴⁹ *Ibid.*

⁵⁰ Scott D. Sagan and Kenneth N. Waltz, *The Spread of Nuclear Weapons: a Debate Renewed* (New York: W.W. Norton and Company, 2003), 45.

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⁵² *Ibid.*, 83.

⁵³ *Ibid.*, 84.

⁵⁴ *The State Department Web Site*, <http://www.state.gov/secretary/rm/2009a/10/130806.htm> (accessed January 18, 2010).

