

# Strategy Research Project

## Nuclear Weapons Strategy for the 21st Century

by

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Throughout history, mankind conducted conflicts or war as the ultimate mechanism to settle disagreements. The nature of war has been timeless, with conventional warfare evolving from “man vs. man” to “army vs. army or navy vs. navy.” Several significant technological advances occurred over time that changed the character of war; one of which was the development and employment of nuclear weapons. On August 6, 1945, a B-29 Bomber dropped “Little Boy,” a uranium based atomic bomb on Hiroshima, Japan. Three days later, another B-29 bomber dropped “Fat Man,” a plutonium based atomic bomb on Nagasaki, Japan. The estimated death toll from both bombings represented a small percentage of the total number of people killed in World War II, but the impacts of the bombings still linger today. This paper will examine the historical context of nuclear weapons and strategy, concept of nuclear deterrence, current U.S. policy, 21st century security concerns, and propose a nuclear strategy going forward. The proposed strategy will still focus on deterrence, but also takes into consideration the need to modernize our nuclear arsenal, resume testing, and increase international transparency for all nuclear states.



## **Nuclear Weapons Strategy for the 21st Century**

Throughout history, mankind conducted conflicts or war as the ultimate mechanism for settling disagreements. The nature of war has been timeless, with conventional warfare evolving from “man vs. man” to “army vs. army, or navy vs. navy.” Several significant technological advances occurred over time that changed the character of war; one of which was the development and employment of nuclear weapons. On August 6, 1945, a B-29 Bomber dropped “Little Boy,” a uranium based atomic bomb equivalent to 14,000 tons of TNT, on Hiroshima, Japan.<sup>1</sup> Three days later, another B-29 bomber dropped “Fat Man,” a plutonium based atomic bomb equivalent to 20,000 tons of TNT, on Nagasaki, Japan.<sup>2</sup> The estimated death toll from both bombings represented a small percentage of the total number of people killed in World War II, but the impacts of the bombings still linger today.

The United States elevated the Clausewitzian concept of escalation through the use of nuclear weapons. After realizing the bombs’ devastating effects, President Truman considered them as a weapon of “last resort.”<sup>3</sup> Unfortunately, the “genie was out of the bottle” with the technological capability and knowledge shared by more than just the United States. In August 1949, the U.S. atomic monopoly disappeared with the Soviet Union’s first nuclear test.<sup>4</sup> Three years later, in October 1952, Britain tested its first internally developed nuclear weapon and France tested a nuclear weapon in February 1960.<sup>5,6</sup> These advancements and more influenced nuclear weapons strategy and policies since 1945.

This paper will examine the historical context of nuclear weapons and strategy, concept of nuclear deterrence, current U.S. policy, 21<sup>st</sup> century security concerns, and propose a nuclear strategy going forward. The proposed strategy will still focus on

deterrence, but also takes into consideration the need to modernize our nuclear arsenal, resume testing, and increase international transparency for all nuclear states.

### History of Nuclear Strategy

Otto Frisch discovered the process of fission in 1939 and became part of the British delegation sent to the U.S. in 1943 to work on the “Manhattan Project.”<sup>7</sup> The Manhattan Project resulted in the development of atomic bombs designed to end the war with Japan and possibly shape the postwar landscape.<sup>8</sup> The bombs achieved their desired “ends,” but subsequently forced senior leadership to develop strategies and policies for future employment. President Truman espoused a policy of “limited use” by keeping the weapons as a last resort.

Rather than compete with the Soviet Union on a conventional basis, President Eisenhower preferred the technical capabilities of nuclear weapons and focused on a policy of massive retaliation.<sup>9</sup> The U.S. nuclear force structure grew in an eight year span from 1,169 weapons in 1953 to 22,229 in 1961. During the same timeframe, the Department of Defense supported efforts to develop intercontinental strike capabilities along with submarine-launched ballistic missiles.<sup>10</sup> These investments provided an overwhelming retaliatory force capable of inflicting incredible destruction. Understanding the numerical and physical advantages of the United States’ nuclear force, the Soviet Union began its own buildup of nuclear weapons that made senior leaders in the U.S. question overall retaliatory capabilities.

President Kennedy, along with Secretary of Defense Robert McNamara, abandoned the massive retaliation policy and adopted the concept of mutually assured destruction (MAD).<sup>11</sup> This policy implied the notion of existential deterrence, whereby the threat of MAD would effectively mitigate nuclear wars or attacks on the United

States. The term existential deterrence refers “to a deterrent effect that arises from the mere existence of nuclear weapons.”<sup>12</sup> For North Atlantic Treaty Organization (NATO) partners, the concept of extended deterrence combined with “flexible response” enabled employment of conventional forces, non-strategic nuclear weapons (provided by the U.S.), or large scale U.S. and British nuclear forces.<sup>13</sup> Extended deterrence refers to deterring “attacks or coercion against the territory of the deterring country’s allies.”<sup>14</sup> Extended deterrence was born out of European concerns about the Soviet Union and its conventional and nuclear intentions. NATO partners relied on the U.S. to counter any attack by Soviet conventional forces by all means necessary, to include the use of nuclear weapons.<sup>15</sup> The policy of MAD prevailed until the 1970s, when some of its strategic concepts changed, but extended deterrence and flexible response remained throughout the Cold War.

By the early 1970s, the U.S. and Soviet Union invested in a strategic triad of intercontinental ballistic missiles (ICBM), submarine launched ballistic missiles (SLBM), and intercontinental bombers.<sup>16</sup> With the increased capabilities of nuclear forces, the question arose again as to how they should be deployed and if mutually assured destruction was the right policy. Discussions and debates centered on “counter” initiatives such as attacking enemy cities (“countervalue”), industrial bases (“countercity”), key military assets to include nuclear forces and command and control systems (“counterforce”), or targets of greatest value to the enemy (“countervailing”).<sup>17</sup> Regardless of which “counter” initiative was adopted, the increased number of strategic nuclear weapons available created additional options for leadership to consider.

During this period, an understanding developed between the U.S. and Soviet Union regarding MAD that led to the signing of a Strategic Arms Limitation Treaty (SALT I) in 1972. SALT I capped strategic ballistic missile launchers and limited missile defense along with limiting interceptors and radar usage. SALT II, developed under President Carter, further constrained U.S. and Soviet Union nuclear delivery vehicles, but it was never ratified by the U.S. after the Soviets invaded Afghanistan.<sup>18</sup> This is important to note, because President Reagan came into office and focused on missile defense systems, causing concern for the Soviet Union. Eventually, both sides realized that strategic defense was too expensive and not viable, so they renewed their interest in arms control.

President George H. W. Bush signed a Strategic Arms Reduction Treaty (START I) with Soviet leader Mikhail Gorbachev in 1991.<sup>19</sup> The treaty focused on reducing not only the number of delivery vehicles but also the number of warheads on each side.<sup>20</sup> President Bush reduced the number of non-strategic nuclear weapons outside of the START I requirements. Prior to the Bush Administration, the U.S. maintained approximately 1,100 non-strategic nuclear weapons spread out across 125 bases in Europe. Since then, the stockpile was reduced to less than two hundred weapons at six bases in Belgium, Germany, Italy, the Netherlands, and Turkey.<sup>21</sup> The signing of START I, the end of the Cold War, and the dissolution of the Soviet Union changed nuclear weapons strategy and enabled the discontinuance of the public rhetoric regarding the “counter” initiatives.<sup>22</sup> In 1993, President Clinton initiated a nuclear posture review (NPR) that delineated a strategy of using nuclear weapons as an effective deterrent and “hedging” against future uncertainty.

President George W. Bush commissioned the 2001 NPR that intended to signal the end of competition with Russia. The report concluded that the U.S. would “no longer size our forces to those of Russia” and use a “capabilities based” approach instead.<sup>23</sup> The 2001 NPR detailed a new strategic triad for nuclear forces, focusing on offensive and defensive capabilities while laying out four primary objectives: assure allies, dissuade nuclear competition, deter adversaries, and defeat enemies should war occur. The report recommended reducing the nuclear arsenal to 1,700 – 2,200 operationally deployed strategic warheads. The signing of the 2002 Strategic Offensive Reductions Treaty (SORT) by the U.S. and Russia implemented the recommendations with a deadline of December 31, 2012.

In 2010, the current NPR was completed under President Obama. The President, in an April 2009 speech in Prague, stated that the U.S. will “seek the peace and security of a world without nuclear weapons.”<sup>24</sup> The 2010 NPR emphasized that goal and recommended a New START limit of 1,550 accountable strategic warheads, 700 deployed strategic delivery vehicles, and 800 combined strategic launchers.<sup>25</sup> Despite the President’s statement, the report noted that the role of nuclear weapons has been reduced but the primary, fundamental role of nuclear deterrence “will continue as long as nuclear weapons exist.”<sup>26</sup> With over 17,000 nuclear weapons in the world today (see Table 1), it is abundantly clear that the U.S. will need to maintain an effective nuclear arsenal and strategy.

Table 1. Federation of American Scientists Status of Nuclear Forces.<sup>27</sup>

Status of World Nuclear Forces 2013*					
<u>Country</u>	<u>Operational Strategic</u>	<u>Operational Nonstrategic</u>	<u>Reserve/ Nondeployed</u>	<u>Military Stockpile</u>	<u>Total Inventory</u>
Russia	1,800	0	2,700	4,500	8,500
United States	1,950	200	2,500	4,650	7,700
France	290	n.a.	?	300	300
China	0	?	180	250	250
United Kingdom	160	n.a.	65	225	225
Israel	0	n.a.	80	80	80
Pakistan	0	n.a.	100-120	100-120	100-120
India	0	n.a.	90-110	90-110	90-110
North Korea	0	n.a.	<10	<10	<10
<b>Total:</b>	<b>~4,200</b>	<b>~200</b>	<b>~5,800</b>	<b>~10,200</b>	<b>~17,300</b>

### Understanding Nuclear Deterrence

The concept of deterrence is not something new. As early as the 6<sup>th</sup> century B.C., Sun Tzu most aptly described deterrence when stating that subduing “the enemy without fighting is the acme of skill.”<sup>28</sup> Throughout Thucydides’ account of the Peloponnesian War, the concept of deterrence is evident in his description of fear as a principal motive of states (e.g. Athens description of warfighting capability to Spartan assembly).<sup>29</sup> Today, Webster’s defines deterrence as “the act of making someone decide not to do something or the act of preventing a particular act or behavior from happening.”<sup>30</sup> The military defines deterrence, in Joint Publication 1-02, as “the prevention of action by the existence of a credible threat of unacceptable counteraction and/or belief that the cost of action outweighs the perceived benefits.”<sup>31</sup> Neither one of the definitions refers to nuclear deterrence in specific terms because the notion of keeping another state from committing some unwanted action emanated long before the advent of nuclear weapons.

It is during the 20<sup>th</sup> century where deterrence became intrinsically linked with nuclear weapons. Bernard Brodie understood this in 1946, when he noted that “thus far the chief purpose of our military has been to win wars” and “from now on, its chief purpose must be to avert them.”<sup>32</sup> The concept of using nuclear weapons as the ultimate means of deterrence developed over the years to the point where “nuclear” and “deterrence” cannot be separated. A quick internet search of examples of deterrence in history immediately pulls up the concept of nuclear deterrence, with little or no mention of conventional deterrence. With an understanding of nuclear deterrence, how does one actually achieve it?

The deterrence of potential adversaries relies on their understanding of the United States’ overall capabilities and intentions. Deterrence is more than technical capabilities and target kill probabilities; it is also tied to our credibility and declaratory policies.<sup>33</sup> According to Yehoshafat Harkabi, in his book *Nuclear War and Nuclear Peace*, “first-strike capability did not constitute a reliable deterrence against nuclear attack.”<sup>34</sup> He went on to state that “to have a credible nuclear deterrent, one needs a second-strike capability that can survive initial enemy attacks.”<sup>35</sup> The use of nuclear weapons in 1945 established the “first-strike” credibility of the U.S. while increasing the size of the arsenal maintained a “second-strike” credibility throughout the Cold War.

Over the years, the size of the arsenal changed along with the physical capabilities of the bombs themselves. In Hiroshima and Nagasaki, bombs were equivalent to less than twenty-five kilotons of TNT yet caused significant deaths and destruction. Those bombs were like a fifty caliber round compared to the rocket propelled grenade destructive capabilities of today’s nuclear weapons. It is estimated

that a single 475 kiloton warhead (W-88, SLBM) can destroy an urban area up to 150 square kilometers.<sup>36</sup> By detonating approximately twenty similar sized warheads, one could destroy up to twelve of Russia's largest cities and kill at least twenty-five million people.<sup>37</sup> For additional perspective, one W-88 warhead could take out the entire city of Damascus in Syria and eliminate its entire population through immediate or long-term effects of detonation. The increased physical capabilities of nuclear weapons enhance deterrence and are integral to nuclear policy today.

#### Nuclear Policy and Situation Today

The 2010 NPR defined the current nuclear policy and posture which focuses on five key objectives: preventing nuclear proliferation and nuclear terrorism; reducing the role of U.S. nuclear weapons in national security strategy; maintaining strategic deterrence; strengthening regional deterrence and reassuring allies and partners; and sustaining a safe, secure, and effective nuclear arsenal.<sup>38</sup> Of the five key objectives noted, alignment of policies and posture to the prevention of nuclear proliferation and nuclear terrorism is our most urgent priority.<sup>39</sup>

Preventing nuclear proliferation and nuclear terrorism is essential for a nuclear free world. Despite the Nuclear Non-Proliferation Treaty (NPT), nuclear proliferation occurred in states such as Israel, India, Pakistan, and North Korea. Discussions are ongoing with Iran over nuclear weapons to keep them from possessing nuclear weapons. To prevent further proliferation, the NPR outlined the following elements: bolstering the nuclear non-proliferation regime; securing vulnerable nuclear materials worldwide; and pursuing arms control efforts.<sup>40</sup> The U.S. achieved the arms control element upon signing the New START with Russia that entered into force in February 2011. The New START set a deadline of February 2018 to "meet the Treaty's central

limits on strategic arms,” but gave each side the “flexibility to determine for itself the structure of its strategic forces within the aggregate limits of the Treaty.”<sup>41</sup> The U.S. must continue working with the other nuclear states to achieve the remaining two elements recommended by the 2010 NPR.

Reducing the role of U.S. nuclear weapons concerns nuclear retaliation or deterrence towards non-nuclear aggression. In the past, the U.S. used nuclear weapons as a deterrent or escalation measure against the use of other weapons of mass destruction (WMD), like chemical or biological weapons. The declaratory policy is now “the U.S. will not use or threaten to use nuclear weapons against non-nuclear weapons states that are party to the NPT.”<sup>42</sup> In light of the reduced role for nuclear weapons, the NPR recommends strengthening conventional capabilities and making “deterrence of nuclear attack on the U.S., its allies, or partners the sole purpose of U.S. nuclear weapons.”<sup>43</sup>

Maintaining a strategic deterrence, despite the reduction in nuclear weapons outlined in the New START, can be done according to the NPR. The strategic triad of SLBMs, ICBMs, and heavy bombers remains intact and the current alert posture remains in effect. The New START limits, when fully implemented, results in a strategic triad of 240 deployed SLBMs, 420 deployed minuteman ICBMs, and up to 60 deployed heavy bombers.<sup>44</sup> Since Russia is a signatory of the New START, one would expect their final nuclear force to look similar based on historical precedents.

Strengthening regional deterrence and reassuring allies or partners requires the U.S. to continue providing a “nuclear umbrella” for the European and Asian region. However, the use of conventional weapons and forces as well as theater ballistic missile

defenses can reduce the nuclear requirements according to the NPR.<sup>45</sup> Regardless of what mechanism is used for deterrence, the U.S must continue to assure allies and partners or risk more nuclear proliferation in the future.

Sustaining a safe, secure and effective nuclear arsenal enables deterrence, provides nuclear umbrellas, and keeps nuclear retaliation as an option. Through the Stockpile Stewardship Program (SSP) and the Life Extension Program (LEP), the U.S. maintains safe and reliable nuclear warheads by refurbishing them, as much as possible, to original specifications. Nuclear support infrastructure is aging, but it is modernized where possible and economically feasible. However, unlike infrastructure, warheads have primarily been refurbished, not modernized, to meet the potential security challenges of the 21<sup>st</sup> century.

### 21<sup>st</sup> Century Security Concerns

During the Cold War, the enemy was clearly defined as another state actor (Soviet Union) and the use of nuclear weapons either as a deterrent or means of attack was credible and effective. As James Woolsey, former director of the Central Intelligence Agency, noted that “we have slain a large dragon. But we live now in a jungle filled with a bewildering variety of poisonous snakes. And, in many ways, the dragon was easier to keep track of.”<sup>46</sup> The ending of the Cold War and the lack of a central enemy has changed the current strategic landscape.

In the past few decades, the U.S. demonstrated conventional superiority over enemies, reducing the likelihood of a conventional war in the future. Using the recent wars in Iraq and Afghanistan as basis for comparison, the strategic mindset is that conflicts will become more asymmetrical in nature to offset this conventional superiority. A rogue nation or non-state actor might consider a land attack cruise missile (LACM),

with a biological warfare payload, a more political and cost-effective weapon system as opposed to a conventional force.<sup>47</sup> An unconventional attack like this will bring into question the role of nuclear weapons as an effective deterrent when dealing with asymmetric challenges (typically non-state actors).

When a non-state actor attacks the U.S., it presents a dilemma because nuclear weapons launched in retaliation will most likely involve inflicting damage on people outside of the terrorist organization and may lead to state-on-state nuclear war. The changing security environment, involving more asymmetrical challenges, leads several strategists to believe that elimination of nuclear weapons is possible in the immediate future based on a more limited role. However, as the security environment becomes more complex, nuclear weapons will remain relevant as a deterrent. The U.S. will need to augment its nuclear deterrent with non-nuclear force options to provide greater flexibility in planning and deterring aggressors.<sup>48</sup> Thus, deterrence in the 21<sup>st</sup> century focuses more on the ability to destroy an enemy's military capability and deny their objectives without having to use a nuclear weapon.<sup>49</sup> Potential security concerns in the future include: nuclear theft and terrorism; nuclear proliferation; rise of new nuclear powers; or actions of existing nuclear powers.

The likelihood that an entire nuclear warhead is acquired and utilized by a terrorist organization or non-state actor is limited based on current accountability measures and security measures on the warhead itself. However, the potential exists to steal nuclear explosive material such as highly enriched uranium and manufacture some sort of “gun-type” weapon system.<sup>50</sup> The 2010 NPR noted the concern over nuclear terrorism and recommended “accelerating efforts to secure all vulnerable

nuclear materials worldwide in four years.” Obtaining a nuclear warhead or materials is a minor security concern for the U.S. and the international community.

Of greater concern is the potential for employment of a “dirty bomb” by a terrorist organization. A “dirty bomb” is a radiological, not nuclear weapon, used to spread radioactive contamination over a large area.<sup>51</sup> The impacts of a “dirty bomb” are far less than a nuclear weapon, but the availability of the radioactive material necessary for the bomb is much greater. Sources of materials are industry, hospitals, research reactors, nuclear power plants, or other enterprises.<sup>52</sup> For example, Cobalt-60 is used in industrial and medical locations worldwide, increasing the likelihood that it could fall into terrorist hands from theft or other means. Fortunately, the more radioactive the material is for making the bomb, the more difficult it is to handle safely. The most probable scenario is a terrorist organization acquiring a low level radioactive material, which would cause minimal impact upon detonation. The international community has already taken steps to better protect nuclear reactor fuel and other sources of radiation.<sup>53</sup>

While nuclear terrorism seems unlikely, nuclear proliferation is quite possible despite historical precedents indicating otherwise. Since 1945, the world has passed through almost seven decades and only nine nuclear states emerged. However, in 2004, everyone learned that obtaining nuclear capability via “black market” mechanisms was entirely possible. The seizure of the BBC China, a German owned vessel bound for Libya, uncovered the machinery necessary to enrich uranium for nuclear bombs. That seizure alone exposed a network, implemented by Abdul Qadeer Khan, which distributed bomb-making designs and equipment to at least three countries (Iran, North Korea, and Libya).<sup>54</sup> The possibility that other state and non-state actors have obtained

nuclear weapons designs cannot be ruled out and presents a potential opportunity for clandestine nuclear proliferation.

Another avenue for nuclear proliferation is interrelated with the global concern over resources and the ability to provide sufficient energy in the future. More states are considering nuclear generation as their primary source of energy, which raises concerns about latent proliferation. Latent proliferation occurs when a member of the Nuclear Non-Proliferation Treaty (NPT) develops the capabilities for a nuclear weapons program within the limits of the treaty or within the façade of observing the limits.<sup>55</sup> Should a state, like Iran did, choose to pursue nuclear generation, they are more than capable of developing weapons and can do so in secret as they are publicly declaring the nuclear generation as their primary goal.

The rise of new nuclear powers, North Korea, India, Israel, and Pakistan, presents concerns for the future for various reasons. First, the likelihood that one of the new powers employs a nuclear weapon is greater given their regional power struggles.<sup>56</sup> For example, the threat of nuclear attack from North Korea is a very real possibility for South Korea. Second, the new nuclear powers are at greater risk to theft of nuclear capabilities from terrorist organizations. They are relatively new to the nuclear arena and may not have the best security in place nor fully understand the nuclear implications like long-standing nuclear powers. Finally, they are more likely to employ their arsenal in error because their small size (refer to Table 1) makes them particularly vulnerable to first strike.<sup>57</sup> Regional power struggles present the most likely scenario for employment of nuclear weapons, so an individual examination of the rising nuclear powers is necessary to assess the likelihood of nuclear weapons usage in the future.

## India

Depending on the estimates, India has in excess of one hundred nuclear weapons in its arsenal and developed a nuclear strategy focusing primarily on an effective deterrent mechanism. Given their neighbors in the north and India's proximity to water makes their borders susceptible to direct threats from ballistic missiles and indirect threats from vessels transporting weapons-related material to rogue regimes.<sup>58</sup> In spite of their deterrent requirements for nuclear weapons, India continues to aggressively pursue a worldwide reduction in nuclear arsenals.<sup>59</sup>

As early as the 1950s, India recognized the need for nuclear disarmament and was a proponent of a comprehensive nuclear test ban. During this same period, India benefitted from Eisenhower's "Atoms for Peace" program and began construction of a nuclear reactor in Apsara. In October 1964, China's first atomic test accentuated security concerns for India and bolstered internal arguments for developing a nuclear weapon. However, their development program would essentially stall for the next twenty years until global events hastened the perceived need for nuclear weapons.

The first event occurred towards the end of 1986, when Indian intelligence efforts gathered information indicating that China provided Pakistan with nuclear weapons design.<sup>60</sup> Knowing the bitter history between Pakistan and India, more troubling to India was the belief that the "United States had turned a blind eye to the Sino-Pakistani collusion."<sup>61</sup> The second event happened in 1988 when the Indian prime minister revealed a disarmament plan for the nuclear states. Based on India's history of promoting disarmament, this should have been greeted with enthusiasm. Instead, skepticism abounds because of the United States' continued elevation of Pakistan as a "frontline ally in South Asia" to counter Soviet aggression (e.g. invasion of Afghanistan

in 1979).<sup>62</sup> Other events occurred on the political front, which ultimately led India to conduct five nuclear tests in May 1998. They became a nuclear state despite their promotion of disarmament and now needed a nuclear strategy or policy aligned with their national security interests.

India's National Security Advisory Board (NSAB) drafted an initial doctrine in late 1999 that focused on a "credible minimum nuclear deterrence."<sup>63</sup> For various reasons, the doctrine was never finalized, but the tenants of the doctrine formed the basis for India's nuclear strategy going forward. Their Cabinet Committee on Security announced additional details on India's nuclear doctrine in 2002. The following provisions were outlined in the Committee's statement: 1) build and maintain a credible nuclear deterrent; 2) nuclear weapons are for retaliation against attacks on territory or forces; 3) retaliation intended to inflict unacceptable damage; 4) only the civilian leadership can authorize retaliatory attacks through coordination with the National Command Authority (NCA); 5) no use of weapons against non-nuclear states; 6) reserve the right to use as retaliation for other WMD attacks on territory or forces; 7) continue enforcing controls on export of nuclear materials and technologies, participating in Fissile Material Cutoff Negotiations, and observing the moratorium on nuclear testing; and 8) remain committed to the goal of a nuclear-free world.<sup>64</sup> In summary, their doctrine simply is maintaining an effective minimal deterrent against security threats while advocating efforts towards global nuclear disarmament.

India refrained from developing a large nuclear arsenal but they still have major concerns about Pakistan and China. China's "no first-use policy" placated India in the past, but recent Chinese desires to return its empire to previous levels makes India

wary. Both countries still have disputes over border and territories, with China claiming Indian states (e.g. Arunachal Pradesh) or large parts of Indian states in the northeast and northwest as Chinese soil.<sup>65</sup> Pakistan presents a different challenge all together, as both countries consider the other a significant threat to national security. Pakistan's nuclear strategy involves a "credible first-use" with individual commander's having the authority to act without input from Pakistan's NCA.<sup>66</sup> Pakistan's nuclear strategy creates additional instability in the Indo-Pakistani military calculations, though both sides have taken measures to mitigate the situation.<sup>67</sup> Whether India maintains its current arsenal while pursuing nuclear disarmament remains to be seen and depends solely on the overall nuclear intentions of Pakistan and China.

### Pakistan

Like India, the actual number of Pakistani nuclear warheads is not known, but estimates are about one hundred and twenty (see Table 1); basically, the same size as India's nuclear arsenal. Unlike India, which has a two-front security concern, Pakistan's nuclear weapons focus only on India. Pakistan's development of a nuclear capability stemmed from a desire to be like India and the understanding that India maintained conventional superiority over Pakistan.

Based on the efforts of A.Q. Khan and the Khan Research Laboratories, it is estimated that Pakistan may have possessed a nuclear weapon as early as 1983.<sup>68</sup> However, it was not until the late 1990s that the world knew about Pakistan's nuclear capability. In May 1998, Pakistan conducted a series of nuclear detonations totaling five or six tests. During these tests, Pakistan detonated nuclear weapons similar in magnitude to those used in Hiroshima.<sup>69</sup> They now needed an effective nuclear strategy to maintain equivalence with India.

In a December 2001 interview, General Khalid Ahmed Kidwai, the director responsible for Pakistani nuclear planning, outlined Pakistan's nuclear strategy which was developed along four "redlines". The four "redlines" encompassed concerns about threats to Pakistan's: 1) territory; 2) armed forces; 3) economic well-being; and 4) ethnic diversity (designed to create civil unrest).<sup>70</sup> The "redlines" established a space threshold, military threshold, economic strangulation, and domestic destabilization, respectively, as acceptable reasons for use of nuclear weapons by Pakistan.<sup>71</sup> However, crossing a "redline" does not automatically result in nuclear retaliation by Pakistan.

The type of confrontation will ultimately determine the response by Pakistan, but given the size of their arsenal, it is unlikely they will use large numbers of nuclear weapons in response to some provocation.<sup>72</sup> For example, in the event of a small South Asia war, if India maintains the conventional advantage on the battlefield, then Pakistan may use warning shots directed at strategic targets (possibly Indian forces) with the hopes of eventual international community diplomatic intervention to end the war.<sup>73</sup> Other scenarios exist for Pakistan to use nuclear weapons, including India's use of air forces instead of conventional ground forces to attack Pakistan. This would give Pakistan a limited amount of time, probably less than five minutes, to make a strategic decision on using nuclear weapons to retaliate. Of greater concern, would be India's use of air forces to attack Pakistan's nuclear infrastructure.

Part of Pakistan's nuclear policy is to keep its weapons partially assembled and not necessarily mated to any type of delivery vehicle.<sup>74</sup> Pakistani rationale for such a posture is that it mitigates the risk of an accidental launch or detonation. However,

strategically, this puts them at greater risk due to longer response times to a nuclear attack and the potential for pre-emptive strikes by India against Pakistan's nuclear arsenal. Further complicating matters, Pakistan has trained over 8,000 military personnel to provide security of the nuclear weapons while enabling the capability of retaliatory use of nuclear weapons by individual commanders.<sup>75</sup> In other countries, such as India or the United States, authority to deploy nuclear weapons is centralized and under civilian, not military, control. Military versus civilian control of their nuclear weapons has sparked debate within Pakistan, resulting in a 2008 decree by President Zardari that "Pakistan would never attack India first with nuclear weapons."<sup>76</sup> Even though top military officials may not agree with it, this statement has not been retracted. Thus, the door may be open for more civilian control of their nuclear arsenal and a centralized authority for employment of weapons in the future.

### Israel

The Israeli national security strategy is predicated on the notion that losing a single war is not a viable option for them. In that light, they maintain a credible deterrent posture, which includes the willingness to conduct preemptive strikes.<sup>77</sup> In the event that deterrence fails, Israel would seek to take the battle to enemy territory.<sup>78</sup> This security strategy applies not only to its conventional capabilities but also to its nuclear arsenal as well.

From Table 1, the estimated number of nuclear weapons is approximately eighty in total. However, Israel refuses to confirm or deny it has nuclear weapons at all and some estimates have been as high as four hundred in their arsenal. Complicating matters even more, Israel adopted a policy that Avner Cohen describes as "nuclear opacity."<sup>79</sup> No one really knows Israel's true nuclear policy, making it difficult for other

governments to accurately assess their intentions and plan accordingly. The only thing known for certain is that Israel does have a nuclear capability based on proclamations from previous Israeli leaders: Ephraim Katzir in 1974, Moshe Dayan in 1981, Shimon Peres in 1998, and Ehud Olmert in 2006.<sup>80</sup> Israel is not a member of the Non-Nuclear Proliferation Treaty but they did sign the Comprehensive Test Ban Treaty in 1996.<sup>81</sup>

### North Korea

Joining the ranks of ambiguous nations, North Korea's nuclear arsenal size is unknown but there is no doubt that they have a nuclear capability. In October 2006, North Korea detonated a nuclear bomb believed to be in the one kiloton or smaller range. Three years later, in May 2009, they conducted another nuclear test believed to be in the two to four kiloton range.<sup>82</sup> Since that test, the United States and other regional powers (e.g. Japan and China) have engaged North Korea in discussions referred to as the Six-Party talks. Unfortunately, the talks have failed to bring any real change in the North Korean nuclear situation. In February 2013, North Korea successfully detonated a nuclear device designed to take them closer to building a nuclear warhead small enough to mount on a long-range missile that could threaten the United States.<sup>83</sup> Much like Israel, North Korea's actions and public statements continue to create uncertainty regarding their actual nuclear strategy and doctrine.

North Korean rhetoric indicates that they will not be getting rid of their nuclear weapons anytime soon. In September 2009, North Korea noted that "dismantlement of nuclear weapons is unthinkable as long as there exists the sources that compelled it to have access to nukes."<sup>84</sup> On January 24, 2013, North Korea reiterated its desire to continue nuclear testing and long-range rocket launches. Specifically noting that "the various satellites and long-range rockets that we will fire and the high-level nuclear test

we will carry out are targeted at the United States.”<sup>85</sup> North Korea believes the United States drove them to acquire nuclear weapons based on the strategic partnership and alliance between the U.S. and South Korea.

Knowing that they possess nuclear weapons, regardless of their strategy, the biggest concern to the international community should be the end state of North Korea’s nuclear arsenal. Just how big will the arsenal be and what capabilities will they have at their disposal? Putting aside their anti-U.S. rhetoric, they primarily desire nuclear weapons for defensive purposes and regime protection. Using Pakistan, India, United Kingdom, France, Israel, and even China as barometers, one would anticipate their nuclear arsenal will end up less than one hundred in total. Given their economic situation and overall lack of infrastructure, some authors have suggested an arsenal in the range of thirty to seventy warheads.<sup>86</sup> Based on recent testing, the presumption is that their weapons delivery systems will be more of the ballistic missile type.

The development of submarine or ship-based launching capabilities would represent a game changer not only in the immediate region, but also to the United States.<sup>87</sup> In 1993, North Korea purchased twelve decommissioned submarines from Russia that could be retrofitted or altered to accommodate the R-27/Taepodong-X missile with an estimated range of 2,500 kilometers.<sup>88</sup> Verification of current and planned capabilities is difficult due to the lack of access in North Korea and its overall failure to adhere to U.N. policies.

Fortunately, actions by recognized nuclear powers (U.S., Russia, United Kingdom, France, and China) have been tempered over the years through diplomatic efforts, treaties, arms control, etc. combined with the basic understanding that the use

of nuclear weapons is “taboo.” The U.S. and Russia weathered the Cold War and moved onto serious talks and actions regarding nuclear disarmament. The United Kingdom and France maintained a small stockpile of weapons primarily out of concerns developed during the Cold War era as well. They also worked with the U.S. and Russia towards nuclear disarmament. Based on all of this, it is unlikely that Russia, France or Britain represent a nuclear threat to the U.S. The one recognized nuclear power that presents legitimate concerns for the future is China.

### China

As noted in Table 1, China has at least 250 nuclear weapons in its arsenal and obviously has the technical capability to expand its arsenal. They have come a long way from a country that lacked nuclear capabilities as late as 1967. Similar to India, the United States played an important role in convincing the Chinese that they needed nuclear weapons.

In 1949, the People’s Republic of China was established by a Communist Party determined to learn from past mistakes regarding their autonomy and foreigners.<sup>89</sup> In the late 1940s and early 1950s, China learned that the USSR could not be counted upon as a partner and that the U.S. could make nuclear threats as done during the Korean War and Taiwan Strait Crises. Subsequently, they set about building the infrastructure and developing nuclear weapons in the late 1950s and early 1960s. Their efforts culminated with the testing of a nuclear warhead in October 1964. In official statements released after the testing, China stated that they “cannot remain idle in the face of ever increasing nuclear threats from the United States.”<sup>90</sup> In the same official statements, China outlined its initial nuclear policy by “solemnly declaring that China will never at any time or under any circumstances be the first to use nuclear weapons” and

that the “Chinese government will promote the complete prohibition and thorough destruction of nuclear weapons.”<sup>91</sup> Chinese nuclear weapons were intended for deterrence from the very start of their nuclear program, something they still officially state today.

In 2006, China’s white paper on defense became their “most authoritative public statement on how Beijing views the security environment” and provided an official explanation of their nuclear strategy.<sup>92</sup> The fundamental goal of China’s nuclear strategy is “to deter other countries from using or threatening to use nuclear weapons against China” while remaining “firmly committed to the policy of no first-use.”<sup>93</sup> In the 2001 edition of *The Science of Strategy*, published by the PLA’s Academy of Military Sciences, “medium strength nuclear deterrence” was defined as requiring a “sufficient and effective nuclear strike force to threaten an opponent by imposing on him unbearable destruction.”<sup>94</sup> Based on the size of their arsenal, official statements, and public documents, it is apparent that China’s concept of “effective deterrence” really correlates to medium strength nuclear deterrence.

Since China clearly delineates a “no first-use” policy and maintains their arsenal for deterrence only, the perception is that they have no offensive intentions for their nuclear weapons. However, China’s actions, military articles, and private conversations may indicate a more aggressive overall posture and a possible lowering of its nuclear threshold. In 1995, General Xiong Guangkai, Chinese Intelligence Department, reportedly stated that China would consider using nuclear weapons against the U.S. and that Los Angeles should be a bigger concern to the U.S. than Taiwan.<sup>95</sup> Major General Zhu Chenghu, China’s National Defense University, in 2005, stated that China

was “under internal pressure to change its no first-use policy” to clarify its intentions regarding nuclear weapons and the Taiwan conflict.<sup>96</sup> A year prior, in 2004, a published article hinted that China “may even lower the threshold of using nuclear weapons to deter intervention by external enemies.”<sup>97</sup> This article was referring to any potential U.S. intervention in China’s attempt at military unification of Taiwan. All of these statements may or may not be indicative of China’s non-public policy and are definitely counter to their public policy.

As recently as October 2013, at the 68<sup>th</sup> session of the United Nations General Assembly, China reiterated their nuclear policy.<sup>98</sup> However, the fact that China “is deploying four new nuclear-capable ballistic missiles invites concern as to the scale and intention of China’s nuclear upgrade.”<sup>99</sup> Complicating matters even more, a 2011 Georgetown University study indicated that the number of Chinese nuclear weapons may be as high as 3,000 missiles.<sup>100</sup> The voracity of the comments and studies may all be in question, but they highlight a central problem concerning China’s nuclear intentions. Their overall lack of transparency and their actions within the immediate region are out of alignment with their public statements.

Over one-third of world trade flows through the South China Sea, which contains over 250 islands and “rocks” with potentially abundant natural resources including oil, natural gas, and fishing reserves. The distinction between a “rock” and “island” means the difference between a 12 nautical mile expanse of territorial waters and a 200 nautical mile Exclusive Economic Zone (EEZ) with associated rights over resources within the EEZ. The Spratly Islands are located in the South China Sea and have become a contentious area based on their resource potential. The China National

Offshore Oil Corporation recently estimated that the disputed areas could contain up to 17 billion tons of oil and 498 trillion cubic feet of natural gas.<sup>101</sup> Ownership of the islands would include the resources underneath and around the islands, providing essential energy and food resources. Conflicts over resources in the South China Sea have led China to flex its military muscle a little more.

In the past ten years, conflicts have escalated between China, Vietnam, Philippines, United States, and other countries in the region. In January 2005, Chinese fired upon two Vietnamese fishing vessels claiming they were pirates. In March 2009, the Pentagon reported that the Chinese harassed a U.S. military surveillance ship. In February 2011, the Chinese fired upon Philippine fishing boats in the vicinity of Jackson Atoll and in July 2012, a Chinese frigate ran aground on Hasa Hasa Shoal, which is within the Philippine two hundred nautical mile EEZ. This occurred after a standoff in April 2012 between a Philippine warship and two Chinese surveillance vessels in the Scarborough Shoal area claimed by both countries.<sup>102</sup> Obviously, when it comes to resources, the Chinese have become more involved and demonstrated a military presence to protect or secure them.

Most recently, China declared an Air Defense Identification Zone (ADIZ) that overlaps those of Japan, Taiwan, and South Korea (see Figure 1). The declaration of an ADIZ is perfectly within China's sovereign rights and they are certainly not the first nation to do so. Unfortunately, "in contrast with the usual defense zone — which helps build stability by reducing the chances of accidents based on mistaken identity — the unilateral and assertive nature of the new Chinese effort increases the risk of conflict."<sup>103</sup> Since China has nuclear weapons and other nations in this conflict don't, assurances

from the U.S. must be provided to respond with either conventional forces or ultimately nuclear weapons should the need arise.

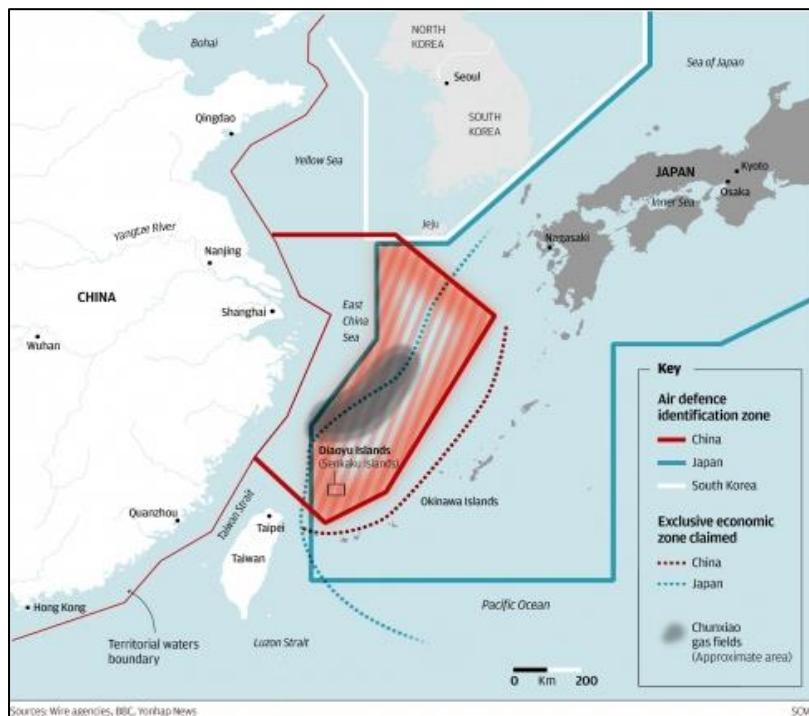


Figure 1. China's ADIZ<sup>104</sup>

Certainly, China represents a principle protagonist in the concerns over employment of nuclear weapons. They are not alone in that role though, with North Korea's and India's intentions ambiguous at best. Joining the list, though not specifically detailed previously, is Russia. Their message is conflicting. On one hand, they have negotiated with the U.S. and reduced their overall nuclear inventory as part of various treaties and agreements. On the other hand, they have declared a policy of nuclear weapons modernization and have recently tested (in 2012) their ballistic missile and defense systems in what they called a "snap check" of their nuclear capabilities. While we don't necessarily consider them to be a nuclear threat, they must be included in discussions of nuclear strategy in the 21<sup>st</sup> century.

## Proposed Nuclear Weapons Strategy

Regardless of what term you use (e.g. asymmetrical, unconventional, or irregular), there is consensus that conflicts for the foreseeable future will involve fighting more non-state actors. One need only recall the events of 9/11, Operation Enduring Freedom, and Operation Iraqi Freedom to fully understand that conventional warfare will be of limited use at most. Nuclear weapons may become the weapons of choice to offset the conventional advantage, but the question remains as to whether or not nuclear weapons can be an effective deterrent against non-state actors? If there is some value to nuclear weapons in the future, what strategy is necessary moving forward?

Clearly, the 2010 Nuclear Posture Review outlines the strategic framework for the United States' nuclear strategy over the next few years. Using the NPR as a guideline to effectively leverage the nuclear arsenal in the 21<sup>st</sup> century, the following strategies are recommended: 1) a continued focus on nuclear deterrence; 2) an appropriate sizing of the nuclear arsenal based on the security environment; 3) a complete modernization of the nuclear arsenal and infrastructure; 4) a continued non-ratification of the Comprehensive Test Ban Treaty (CTBT); 5) a clearly defined declaratory policy delineating the U.S. nuclear strategy; 6) a renewed focus on providing greater transparency for all nuclear states; and 7) a renewed diplomatic focus on the nuclear proliferation treaty.

### Recommendation One: Continued Nuclear Deterrence

As noted earlier, two of the five objectives outlined in the NPR deal with the use of the nuclear arsenal as a deterrent. Today, there are five recognized (signatories on the nuclear proliferation treaty) nuclear states: U.S., Russia, China, Great Britain, and

France. There are also four unrecognized states: India, Pakistan, Israel, and North Korea. Based on the number of nuclear states today, there are three primary reasons why the nuclear arsenal must remain as a deterrent. The first is that, until there is one hundred percent certainty that all nine states have eliminated their nuclear arsenals and the ability to quickly restore them, there will be a need for nuclear weapons. Without a nuclear arsenal, the ability to deter the other nuclear states is minimal at best. There is not a current conventional capability equivalent to the devastating power of a nuclear bomb, making the U.S. inferior to other nuclear states without a nuclear arsenal.

Second, as other states, like China, increase their conventional force capabilities then the need for nuclear weapons as an escalatory weapon remains. China continues to use their economic prosperity to heavily invest in their conventional capabilities. Recently, they demonstrated a fully functional aircraft carrier on par with U.S naval forces and are now in the process of establishing the air wings for their carrier fleet. While the U.S. maintains superiority now, the world will catch up eventually. Nuclear weapons provide the necessary tools to quickly escalate a war or match the escalation by another nuclear state.

The final reason has to do with nuclear proliferation itself. Arguments have been made that nuclear proliferation occurred despite the nuclear arsenals possessed by the U.S. and Russia. This would be a fair statement as India, Pakistan, North Korea and Israel all opted out of the NPT to develop nuclear weapons. The counter argument is that only four other states pursued nuclear weapons in the last 60+ years even though some states are clearly located in regions of instability. Some states like South Africa, Brazil, Argentina, Libya, Ukraine, Kazakhstan, and Belarus gave up their nuclear

weapons or desires to develop nuclear weapons.<sup>105</sup> Other states like Japan, South Korea, Germany, and Taiwan have not pursued nuclear weapons, even though they possess the technical expertise, based on assurances provided by the United States.

NATO and Asia-Pacific partners and allies rely on the U.S. nuclear arsenal to provide them a “nuclear umbrella” in the event they are attacked by nuclear weapons. Elimination or even severe reductions to the nuclear arsenal seriously jeopardizes the ability to assure allies and partners. If the U.S. is not able to provide the “nuclear umbrella,” then certainly countries like Japan will develop nuclear warheads and build up their arsenal. Japan has already announced increases to its conventional military budget for the first time in eleven years, based on concerns about China and the U.S. ability to effectively protect them with a reduced military force.<sup>106</sup> Without assurances from the U.S., a new era of nuclear proliferation would commence, leading to more nuclear states, more arms races, and more chances of nuclear catastrophe.

#### Recommendation Two: Appropriately Sized Arsenal

President Obama has made it clear that the world needs to be free of nuclear weapons. However, that is not feasible today. So, if the world can't get rid of nuclear weapons just yet, then how many does the U.S. need to fulfill the primary role of deterrence (and assurance)? Depending on which article or study one reads, the proposed size of the nuclear arsenal ranges from a low of 700 warheads to as much as 2,200 warheads (recommended in the 2001 NPR).

Determining the exact size of the arsenal is difficult for a variety of reasons, including: 1) uncertainty of future capabilities of missile defense system; 2) the aging of warheads creating reliability concerns; 3) the aging of nuclear support infrastructure; 4) the potential loss of human capital; 5) uncertainty of nuclear weapons status of other

states; 6) uncertainty over future nuclear proliferation; and 7) the failure to adequately modernize nuclear capabilities. Throw into the mix the debate over whether or not the arsenal should be sized according to Russia's and one can clearly understand the complexities of the issue. As recent as 2011, William Perry and James Schlesinger, two former Secretaries of Defense, recommended sizing the arsenal based on Russia. The 2001 NPR recommended sizing the arsenal on a capabilities based approach rather than a particular country. The 2010 NPR went back to the Russia sizing methodology. Obviously, there is no simple answer to this question.

Modeling done by Stephen Cimbala, Professor at Penn State Brandywine and author of several well-known books on nuclear strategy, indicates that the survivability of the U.S. nuclear arsenal to a first-strike is roughly between 22 – 44%.<sup>107</sup> The survivability varies based on overall alert posture and whether or not the U.S. decides to ride out the attack before launching a retaliatory response or launch a retaliatory response upon warning of attack. This means, for an example arsenal of 1,000 warheads, one would expect that 220 – 440 warheads would be available for a second-strike (retaliatory) response (see Figure 2).

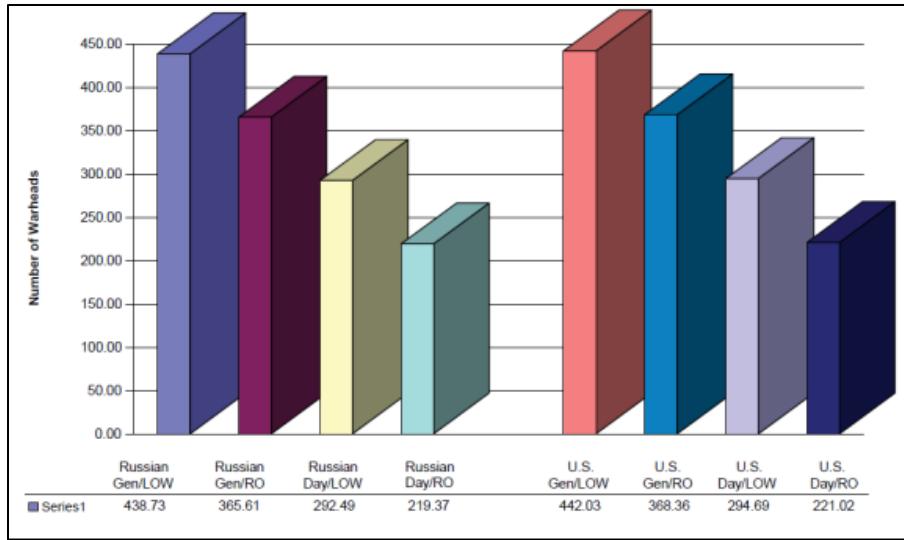


Figure 2. U.S., Russia Surviving and Retaliating Warheads, 1,000 deployed weapons.<sup>108</sup>

The expected survivability and retaliatory capability is based on the conditions of alert and launch protocols such as: 1) generated alert, launch on warning (GenLow); 2) generated alert, riding out the attack and retaliating (GenRO); 3) day-to-day alert, launch on warning (DayLOW); and 4) day-to-day alert, riding out the attack, and retaliating (DayRO).<sup>109</sup> The NPR recommended a limit of 1,550 accountable strategic warheads, which was adopted into the New START that went into force in February 2011, after being signed by the U.S. and Russia. Using this model as a starting point, and recognizing the provisions within the New START, a recommended arsenal around 1,200 warheads is not unreasonable. To maintain a second-strike capability with less than 1,200 warheads, missile defense systems must be capable of increasing the survivability rate for the nuclear arsenal.

The only way that can be done is by upgrading the technology and capabilities of U.S. missile defense systems, which is not likely in the current fiscally constrained environment. The most recent rounds of budget talks and subsequent appropriation

acts resulted in approximately \$7.9B allocated for the Missile Defense Agency, with the majority intended for Research & Development efforts. The budget includes approximately \$1 billion for the Ground Missile Defense (GMD) system: intended for refurbishing and upgrading the thirty interceptor missiles currently deployed; deploying fourteen additional interceptors at the existing launch site in Alaska; and surveying locations for a third missile interceptor launch site on the East Coast.<sup>110</sup> However, the current GMD system is designed to counter only a few missiles from rogue nations (e.g. North Korea or Iran). The system cannot counter a large strike from Russia or China without significant financial resources, something that was understood during the 1980s.

#### Recommendation Three: Modernization of the Nuclear Arsenal

The right mix of weapons is just a part of the strategy going forward. Typically, nuclear weapons have undergone Life Extension Program (LEP) or Stockpile Stewardship Program (SSP) refurbishments to keep them in line with original specifications. The intent of the refurbishment is to maintain a reliable arsenal without manufacturing any new weapons. At some point refurbishment will put warheads too far away from the original specifications and create serious reliability concerns.

According to the Congressional Budget Office (CBO), modernization includes the acquisition costs for major LEP; for new systems that replace the current delivery systems; for LEPs for warheads; and for development of the new SSBN reactor.<sup>111</sup> In other words, the definition used for modernization typically refers to the refurbishment efforts such as the LEP and SSP. Webster's defines modernize as "to begin using the newest information, methods, or technology."<sup>112</sup> The distinction is necessary because modernization, using the Webster's definition, of the U.S. nuclear arsenal should be done moving forward.

The ability to deter “rogue” states or non-state actors with the nuclear weapons in the current arsenal has become a topic of interest lately. In order to minimize collateral damage, the development of low-yield, highly accurate nuclear weapons becomes critical.<sup>113</sup> Beyond the conventional targets for nuclear weapon use, there is a need to access targets that are deep underground. Specifically, targets that are hardened (by earth or concrete) and deeply buried may continue to be the homes for terrorist organizations much like Al Qaeda. Modernization of the nuclear arsenal reduces the reliance on antiquated technology (high-yield, inaccurate) to perform this mission.

Recently, in a House Armed Services Committee's hearing, officials announced details about the B-61 nuclear weapon program to the Subcommittee on Strategic Forces. The new variant of the B-61, called the B61-12, replaces the older variants (B61-3, 4, 7, and 10) as well as the bunker-busting B-61-11 and B-83 strategic nuclear bombs.<sup>114</sup> The new weapons will be deployable using fighter jets like the F-16 or the new F-35 and with strategic bombers like the B-2 "Spirit".<sup>115</sup> According to the Honorable Madelyn Creedon, “the B61 is the oldest warhead design in the U.S. nuclear stockpile, with several components dating from the 1960s,” and “its modernization is the first full-scope LEP since new warhead production was suspended in the 1990s.”<sup>116</sup> However, some experts view the B-61-12 as more than a life-extension program and consider it to be a new nuclear capability.<sup>117</sup> One could really consider this as modernization as the B61-12 leverages existing parts from other warheads and systems to provide the new capability.

In accordance with the 2010 Nuclear Posture Review, U.S. nuclear policy is that “Life Extension Programs … will not support new military missions or provide for new military capabilities,” meaning the B61-12 cannot provide a new capability.<sup>118</sup> Arguments have been made that the warhead merely replaces existing warheads, but the additional guidance tail kit exceeds the accuracy capability of earlier models. Regardless of the arguments, this modernization needs to occur in the interest of national security. First, the B61-12 is suitable for use in regional conflicts where the bomb’s combination of lower-yield and higher accuracy lowers collateral damage compared to other warheads.<sup>119</sup> Second, the B61-12 can be forward deployed by different aircraft, making it a great asset for compellence operations that are essential for maintaining “extended deterrence.”<sup>120</sup> Finally, the B61-12 might encourage other modernization efforts for other warheads within the stockpile and reduce the overall size of the U.S. nuclear arsenal.

Modernization goes beyond the warheads. The infrastructure, to include facilities, delivery systems, and platforms are aging along with the nuclear warheads. There are three laboratories (Los Alamos, Lawrence Livermore, and Sandia), four production plants (Amarillo, TX, Oak Ridge, TN, Kansas City, MO, and Aiken, SC) with different functions, and the Nevada Test Site. Delivery systems include the intercontinental ballistic missile and the submarine launched ballistic missile system. Platforms include the B-2 and B-52 bombers as well as nuclear submarines. All infrastructure is in various states of aging, requiring upgrades or modernization, with some facilities originating with the Manhattan Project.

The FY14 National Defense Authorization Act provided approximately \$17.6 billion for the Department of Energy’s nuclear weapons program, but only \$7.9 billion

was directed at weapons activities.<sup>121</sup> According to the National Nuclear Security Administration (NNSA), the \$7.9 billion will be used on Life Extension Programs, dismantling and eliminating weapons, science and engineering efforts, and improvements to its supercomputer used for simulation of testing.<sup>122</sup>

Obtaining actual numbers spent on the nuclear arsenal and its infrastructure is difficult. However, it is estimated that FY2010-2018, the U.S. will spend at least \$179 billion (see Figure 3) to maintain the current nuclear triad of missiles, bombers, submarines, and associated nuclear weapons, and to begin the process of developing their next generation replacements.<sup>123</sup> Providing funding for modernization will require some tough decisions by senior leadership and undoubtedly impact the nuclear arsenal.

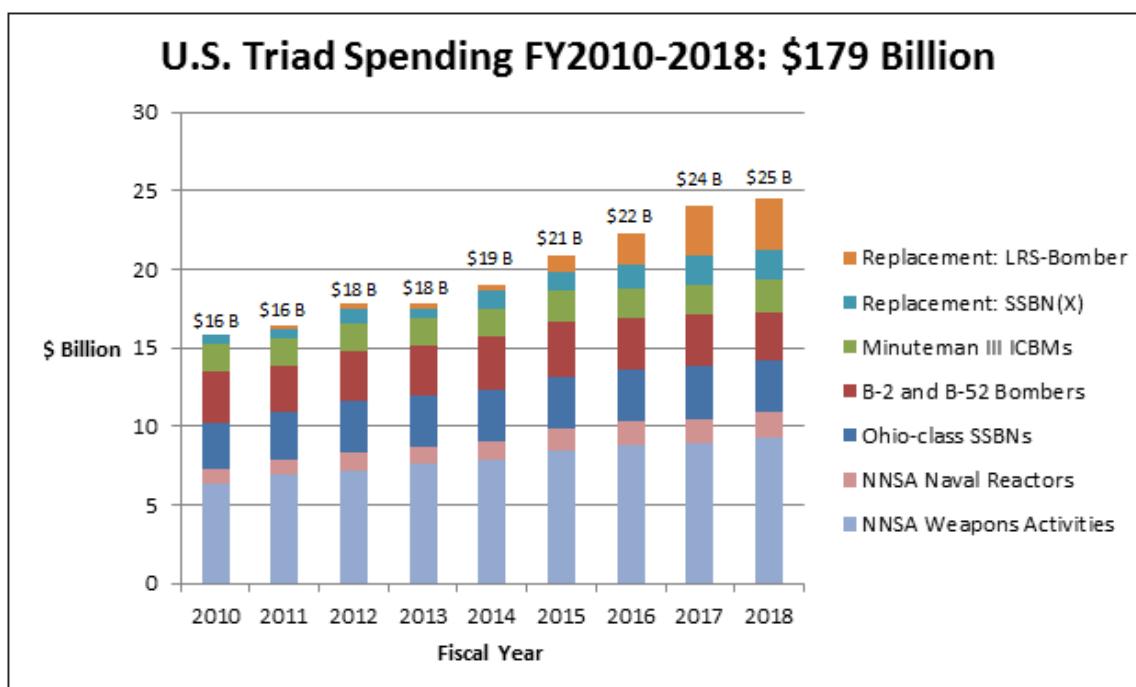


Figure 3. Estimated U.S. Spending for Nuclear Triad, FY10 – FY18.<sup>124</sup>

#### Recommendation Four: Non-Ratification of the CTBT

The concern with modernization of nuclear warheads is the likelihood of testing. The United States has not conducted a test since 1992 because of initial adherence to a unilateral testing moratorium and eventually the provisions of the Comprehensive Test Ban Treaty.<sup>125</sup> Congress never ratified the treaty, but the 2010 NPR recommends ratification for several reasons. The NPR states that ratification is essential in leading other nuclear states toward a world of diminished reliance on nuclear weapons, reduced nuclear competition, and eventual nuclear disarmament.<sup>126</sup> Ratification by the U.S. would also encourage ratification by other states, like China and provide incentives for other states to work towards entry into force of the treaty.<sup>127</sup>

The Congressional Commission on the Strategic Posture of the United States was divided on the issue of CTBT ratification.<sup>128</sup> Opponents believe that ratification may jeopardize national security. First, they argue that there is “no linkage between the absence of U.S. testing and non-proliferation.”<sup>129</sup> This argument is supported by historical precedence. The U.S. signed the CTBT in 1996 and since then three nuclear states developed weapons even though we stopped testing.

Their second argument is that the U.S. would likely follow the restrictions of the CTBT strictly and require the new nuclear states to sign and/or ratify the treaty as well.<sup>130</sup> The likelihood of all the new nuclear states signing and abiding by the terms of the CTBT is unlikely. While a convincing argument, the immediate counter from the proponents of ratification is that the U.S. can always withdraw from the CTBT. However, withdrawing from a ratified treaty to conduct testing, seriously impacts credibility going forward and may bring into question the United States’ intentions regarding a nuclear free world.

The ambiguity of the CTBT with regards to what constitutes a nuclear test is the third argument of opponents to ratification. Strict interpretation defines a test as any explosion or detonation producing a nuclear yield. Other countries take more liberal interpretations of the CTBT and could conduct tests that are low-yield in nature. There are legitimate questions as to whether or not Russia and China conducted such tests.<sup>131</sup> Without an agreed upon definition of a nuclear test within the confines of the CTBT, the U.S. would be at a strategic disadvantage compared to other countries. Additionally, the ability to modernize nuclear warheads would be marginal at best without testing.

Finally, the opponents on the commission identified the problem discussed in recommendation three—to ensure a safe, reliable nuclear arsenal, the U.S. will need to modernize its warheads. The effectiveness of modernization efforts leads to the need for full validation of capabilities, which will require testing. As the U.S. continues to sign treaties reducing the nuclear arsenal, “confidence in each weapon becomes paramount, but CTBT ratification would foreclose means to that confidence.”<sup>132</sup> This is most critical argument for non-ratification of the treaty. The President, and the country, can avoid international embarrassment or “scorn” from not ratifying the treaty by developing a declaratory policy about modernization and testing.

#### Recommendation Five: Develop a Clear Declaratory Policy

If testing is conducted in the future, a clearly defined policy that delineates nuclear intentions for the U.S. will maintain the openness and transparency with other nuclear states. In the past, the U.S. declaratory policy provided overall intent with respect to the use of nuclear weapons, even if a little ambiguous about it. As a matter of practice and policy, the U.S. must maintain a little ambiguity regarding the usage of nuclear weapons.<sup>133</sup> However, the declared policy should explain why the U.S. is

modernizing the force, why testing is needed, and why U.S. modernization is a benefit for the international community. The declared policy would still emphasize that the nuclear arsenal is for deterrence purposes only, but providing more clarity enables the U.S. to continue navigating towards the President's goal of a nuclear free world.

#### Recommendation Six: Greater International Transparency

The New START treaty requires detailed data exchange along with semiannual data updates between the U.S. and Russia. Additionally, each side is required to notify the other of any changes regarding their strategic forces and either side can request up to eighteen, short-notice, on-site inspections to verify the data provided. This level of transparency provides both sides with a better understanding of their strategic forces and allows each side to make more informed decisions. Unfortunately, the New START is only an agreement between two countries that committed to reducing their nuclear arsenals.

Adopting a similar treaty or mechanism for transparency on the international order is much more complex than bilateral discussions. Working with the other nuclear states, to hopefully include North Korea in the discussions, provides the ability to take the transparency, reporting, and data sharing conducted by the U.S. and Russia and implement it among all nuclear states. A strong international agency is necessary to enforce any agreements. The IAEA is currently described as the world's nuclear watchdog, yet their budget is less than the size of the police force for Vienna, Austria.<sup>134</sup> The IAEA must have its prominence bolstered both financially and punitively (ability to levy sanctions). This will enable them to establish consistent verification standards and provide accurate assessments of the current global nuclear status. It will also establish

consequences associated with nuclear behaviors outside the norm (for example, withdrawal from the NPT).

As one of the principal proponents of greater transparency, the U.S. needs to leverage its diplomatic acumen to convince the member nations to increase IAEA funding levels, even if that means a one-time injection from the U.S. and other nuclear states to make it happen. The nuclear states must also ensure adherence to the “Additional Protocol” regarding nuclear safeguarding standards as a condition of supplying nuclear materials to recipients for peaceful use.<sup>135</sup> The U.S. should work with other nuclear and non-nuclear states for ideas that would strengthen the IAEA and provide an opportunity for greater transparency. The IAEA should develop or leverage an existing verification protocol that is adhered to by all nuclear states, not just the U.S. and Russia.

#### Recommendation Seven: Renewed Focus on NPT

No discussion on nuclear proliferation and its merits can start without referencing the efforts of Scott Sagan and Kenneth Waltz in their book, *The Spread of Nuclear Weapons: A Debate Renewed*. Waltz wrote that “fifty percent growth in the next decade” and a “world populated by fifteen or eighteen nuclear weapons states” is quite possible.<sup>136</sup> Waltz theorized that the destructive capabilities of nuclear weapons would make miscalculation by new nuclear states difficult because they know how much damage can be done by a small number of warheads.<sup>137</sup> Based on the lack of direct conflict between the U.S. and the Soviet Union, he believes that the likelihood of war decreases as deterrent capabilities increase.<sup>138</sup> Sagan does not share the same views.

Sagan believes that new nuclear states are likely to be accident prone based on their regional proximity, lack of transparency, political unrest, and delegation of

command authority.<sup>139</sup> He advocates an organizational theory approach to nuclear proliferation. This approach suggests that the United States should continue the policy of non-proliferation, apply more intellectual persuasion (e.g. express why proliferation is not in a country's best interest), and maintain a healthy perspective on proliferation despite attempts to prevent it.<sup>140</sup> In particular, Sagan notes that the "United States and Russia should try to become more like some of the nascent nuclear states, maintaining very small nuclear capabilities."<sup>141</sup>

Of the two respected authors, Sagan is in alignment with U.S. strategy regarding nuclear weapons. The first objective, as stated in the 2010 NPR, is to prevent nuclear proliferation. Sagan could not have been more prophetic regarding new nuclear states. Israel, Pakistan, India, and North Korea provide excellent examples of potential miscalculation concerns based on regional proximity, lack of transparency, or delegation of command authority. Waltz missed the mark when indicating that there could be a fifty percent increase in the next decade, which ended in 2013. Fortunately, the world added only one known nuclear state since 2003 (North Korea). The non-proliferation efforts are working and one of the primary tools has been the non-proliferation treaty.

Of the nations of concern previously mentioned, it is interesting to note that none of them are signatories to both the NPT and the CTBT. Table 2 below indicates the current status of nuclear states with respect to the both treaties. The nuclear non-proliferation treaty started out as a proposal by Ireland to the UN General Assembly in 1959. The initial proposal prohibited countries not already possessing nuclear weapons from obtaining them. After years of negotiations, it went into effect and kept nuclear countries from "relinquishing control of nuclear weapons" and "transmitting information

on manufacture to non-nuclear states.”<sup>142</sup> The treaty was entered into force in 1970 and has one hundred and ninety parties as membership.

Table 2. Non-Proliferation Treaty and Comprehensive Test Ban Treaty Status

Nuclear State	NPT Status <sup>143</sup>	CTBT Status <sup>144</sup>
<b>China</b>	Acceded in 1992	Signed 1996, Not Ratified
<b>France</b>	Acceded in 1992	Signed 1996, Ratified 1998
<b>India</b>	Not a signatory	Not a signatory
<b>Israel</b>	Not a signatory	Signed 1996, Not Ratified
<b>North Korea</b>	Withdrew in 2003	Not a signatory
<b>Pakistan</b>	Not a signatory	Not a signatory
<b>Russia</b>	Signed 1968, Ratified 1970	Signed 1996, Ratified 2000
<b>United Kingdom</b>	Signed 1968, Ratified 1968	Signed 1996, Ratified 1998
<b>United States</b>	Signed 1968, Ratified 1970	Signed 1996, Not Ratified

Since the NPT went into effect, proliferation extended to four new nuclear states, one of which literally withdrew from the NPT to develop nuclear weapons. Within the last few years, there were serious concerns that Iran would become yet another member of the nuclear states, which could have meant their withdrawal from the NPT as well. Fortunately, the UN worked with Iran and the five recognized nuclear states to negotiate a deal where Iran suspends nuclear activities in exchange for sanctions relief. All sides agreed to work towards a permanent solution over a six month period that will ease the concerns over Iran’s nuclear program and their intentions. The diplomatic efforts of the U.S. and other countries clearly demonstrated that nuclear wild cards, like Iran was becoming, can be dealt with peacefully. Similar diplomatic efforts are needed

to conclude the six-party talks with North Korea and encourage it to eliminate its nuclear arsenal or become more transparent in its capabilities and intentions.

### Conclusion

In summary, nuclear weapons became part of military capabilities in the 1940s and there is still a recognized need for them. Despite best efforts, nuclear proliferation occurred, but not at the rate feared by many. Even those states that became nuclear, their arsenals are limited compared to the U.S. and Russia. While the U.S. and Russia have taken steps to reduce their strategic nuclear arsenals, both will continue to maintain a numerical superiority over most of the nuclear states. This has led to reports and studies advocating a nuclear free world, which was endorsed by President Obama in his 2009 speech.

In light of the current nuclear landscape, the prospect for a nuclear free world occurring in the immediate future is extremely limited. However, that does not mean the U.S. can't take incremental steps towards that goal while maintaining a safe, secure, and effective nuclear arsenal to carry out the primary mission of deterrence. The U.S. can also work with other nuclear states to promote an international environment where nuclear weapons are a stabilizing factor and not a cause for security concerns. Winston Churchill accurately summed up the need for nuclear weapons for the foreseeable future.

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