# NPR Next: AY17 Strategic Deterrence Research Papers

Edited by: Dr. Mel Deaile Mr. Al Mauroni



US Air Force Center for Unconventional Weapons Studies Maxwell Air Force Base, Alabama

## **NPR NEXT:**

## **AY17 Strategic Deterrence Research Papers**

Edited by Dr. Mel Deaile and Mr. Al Mauroni

**USAF Center for Unconventional Weapons Studies** 

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# Preface

During the Academic Year 2017, the U.S. Air Force Center for Unconventional Weapons Studies (CUWS) provided a Deterrence Research Group elective for the Air War College and Air Command and Staff College. Thirteen students (six from the Air War College, seven from the Air Command and Staff College) with broad and diverse backgrounds participated in this course, engaging in critical thinking about the nature of strategic deterrence and the role of nuclear weapons under strategic deterrence policy. The class took two field trips: one to Washington, DC, to engage with the Office of the Secretary of Defense policy-makers, Joint Staff and Air Staff offices, the State Department, and the Central Intelligence Agency. The other field trip was to Los Alamos National Laboratory and Sandia National Laboratory to discuss the technical side of nuclear weapons.

Dr. Mel Deaile, Dr. Todd Robinson, Col. Glen Hillis, and Mr. Brad Hammitt were the instructors of this elective and faculty advisors for student research, in particular the Air War College professional study papers. The research questions came from the commander, U.S. Air Force Global Strike Command, and the Deputy Chief of Staff for Strategic Deterrence and Nuclear Integration (HAF/A10). Lieutenant General Jack Weinstein asked the Air University students to look at (among other topics) how the United States might ensure that the nuclear deterrent and assurance capabilities remain credible, how to counter a modernizing nuclear adversary, and how to integrate new technologies into the nuclear modernization efforts. All of these issues will be developed under the next Nuclear Posture Review. The results of the best student research papers addressing this question are presented in this book.

### **CHAPTER 1**

# The Complexity of Threats to Nuclear Strategic Deterrence Posture

William Fairclough, Colonel, United States Army

No one was going to be the winner in such a nuclear war. The destruction might be such that we might have ultimately to go back to bows and arrows.

- Eisenhower, 1956

For good reason, a wealth of scholarly information is available that discusses the topic of U.S. efforts at nuclear strategic deterrence as the concept itself elicits an emotional response from a wide range of actors. These include key stakeholders, such as the United States, which holds the power of thermonuclear weapons, to non-state actors or belligerents, who wish to acquire such power. Even the relatively uninformed now inquire about nuclear strategic deterrence and question how such a nebulous concept has persevered for almost seven decades. Today, once again, deterrence strategists are "…faced with novel and baffling problems to which we try to adapt ready-made strategic ideas inherited from the past. If we examine the origin and development of these ideas, we may be better able to judge whether they actually fit the present and future."<sup>1</sup>

Ultimately, regardless of ownership or primacy, as long as nuclear weapons exist in the world today and in the future, the United States must understand and contend with a host of threats in the future global security environment to deter adversaries and ensure the country maintains an effective nuclear strategic deterrence posture. Unfortunately, attempting to describe and predict the future global security environment is inarguably an arduous task. Technology along with weapons proliferation has rapidly advanced, disparate ideologies and threats have continued to change, and globalization is now an indelible part of life.<sup>2</sup> With all the changes that continue to occur, it is a certainty that complexity will remain the norm in describing the global joint operating environment (JOE), and with it, the capability of the United States to maintain effective strategic deterrence.

Primarily four deleterious trends exist in the current JOE that influence the posture of the U.S. nuclear enterprise: nuclear weapons modernization and technological innovation efforts by People's Republic of China (PRC) and Russia; Democratic People's Republic of Korea (DPRK) nuclear weapons proliferation efforts and ongoing belligerence; instability in South Asia; and Iran's persistent pledge to procure nuclear weapons and export terrorism.

Although both the PRC and Russia remain as members of the Nuclear Nonproliferation Treaty (NPT), each has robust nuclear arsenals, continues nuclear weapons modernization efforts, and more importantly, continues to pursue more effective long-range weapons delivery platforms and hypersonic technology. The DPRK continues to pursue nuclear weapons materiel and technology, more effective long-range weapons delivery, and overall, propagates regional instability. In South Asia, "India and Pakistan have demonstrated the capacity to detonate nuclear devices, possess the means to deliver them, and are not party to the NPT."<sup>3</sup> More frightening, however, is not their antagonistic attitude toward each other, especially concerning disputes over Kashmir, but more specifically that Pakistan is a safe haven for violent extremists. If a coup or lapse in security were to occur in Pakistan, the question is, "…What would happen to its nuclear weapons?"<sup>4</sup> Additionally, "With the potential for increased proliferation and growing concerns about nuclear security, risks are growing that future wars in South Asia and the Middle East would risk inclusion of a nuclear deterrent."<sup>5</sup>

Regarding Iran's ongoing commitment to procure nuclear weapons, and being the world's greatest sponsor of terrorism, the fourth trend that influences the posture of the U.S. nuclear enterprise is Iran. Although Iran is a signatory to the Joint Comprehensive Plan of Action (JCPOA), elimination of the plan at the behest of a new U.S. administration is feasible, if not entirely likely. As Iran's pledge to procure nuclear weapons remains steadfast and their JCPOA commitments reversible, Iran's enduring influence to the posture of the U.S. nuclear enterprise remains obvious. In fact, regardless if the JCPOA is voided at the behest of the United States, as stated by the Department of National Intelligence, National Counter-proliferation Center Director Lehnus, "The challenge is detecting or knowing when these states move from an agenda of developing civil nuclear-energy capabilities to developing nuclear weapons."<sup>6</sup> In addition, as Iran continues to be the world's greatest sponsor of terrorism, their activities alone, in effect, promote nuclear terrorism on a global basis as they provide much of the rhetoric and means to either entice or acquire nuclear weapons.

Taking into account the enduring and pervasive nature of complexity in the global security environment, and the threats that will likely evolve, this paper attempted to answer the question of how current and future threats in the global security environment affect nuclear strategic deterrence posture.<sup>7</sup>

The purpose of this research was to examine in detail the complexity of current and future threats to effective nuclear strategic deterrence posture. Specifically, this research analyzed how the current and future global security environment out to the year 2035 affects the U.S. nuclear enterprise from its ability to successfully assure allies and deter belligerence from a host of regional

and global actors. Realizing there is a multitude of disparate threats associated with the current and future global security environment as determined in the course of this research, ultimately the strategy, modernization efforts, and force structure of the nuclear enterprise must adapt and maintain the ability to deter current and emerging threats in the next 20 years.

#### **Findings and Analysis**

Analysis conducted in this research provided a multitude of findings applicable to the research question of how current and future threats in the JOE affect nuclear strategic deterrence posture and hypothesize that strategy, modernization efforts, and force structure of the nuclear enterprise must adapt and maintain the ability to deter current and emerging threats in the next 20 years. Below is a compilation of findings procured through examining depictions of the future global security environment, as well as analysis of three credible future scenarios which will weigh in on the outcome of this research.<sup>8</sup>

#### The Future Global Security Environment

As shown in the *Joint Operating Environment 2035*, the Department of Defense's description of the global security environment in 20 years, the future global security environment, much like the current global security environment, remains rife with inherent complexity and, therefore, difficult to approximate. It is, however, described in an appropriate manner by utilizing "...two distinct but related sets of challenges. The first is *contested norms*, in which increasingly powerful revisionist states and select non-state actors will use any and all elements of power to establish their own sets of rules... The second is *persistent disorder*..."<sup>9</sup>

Analyzing each of these sets of challenges in the context of both the primary research question and hypothesis provided helpful findings regarding the capabilities and intentions of potential adversaries and more importantly their influence to the U.S. nuclear enterprise writ large.

Specifically, "...there will be a significant evolution in long-range strike weapons capable of ranging the U.S. homeland. Russia will modernize its land, air, and sea-based intercontinental nuclear forces."<sup>10</sup>

In addition, findings show that "China's recent industrial and economic growth combined with its desire to once again be a regional hegemon and global power may result in new nuclear doctrine emphasizing first use and a counter force approach."<sup>11</sup> As China continues to move toward economic parity with the United States, this is intuitively a concern.

Concerning the possibility of a direct threat to the U.S. homeland, findings also provided additional context to this research. More specifically, "Future delivery mechanisms might include hypersonic missiles, long-range cruise missiles, and ballistic missiles with maneuverable warheads, all designed to penetrate U.S. defensive systems."<sup>12</sup>

#### Fairclough

Findings relative to analysis of the future global security environment illustrate that as information becomes more freely and rapidly transmitted in a covert manner due to an ever-increasing globalized world, nuclear weapons technology procured through illicit means is likely. Realizing that possession of technology to construct nuclear weapons is only part of the equation, and there still exists a requirement for fissile material and hardware, as history has shown, the safety and security of such material is still suspect and remains vulnerable in many nationstates such as Pakistan and Russia.

Findings also showed that when examining complexities in the future global security environment, threats are also likely to come from both current nuclear states and non-state actors attempting to "pursue a rudimentary nuclear capability to establish a credible nuclear deterrent."<sup>13</sup> Additionally, "some states may attempt to 'break out' of the Non-Proliferation Treaty regime and deploy dozens to hundreds of nuclear weapons on a range of delivery platforms…"<sup>14</sup> Ultimately, nuclear terrorism will continue to be a major concern in the future global security environment (as it is currently), particularly as nations continue to fragment and radicalism continues to spread worldwide.

Though the above discussion is not an all-inclusive list of threats in the future global security environment that will influence U.S. strategic deterrence posture, the aforementioned will undoubtedly play a critical role in influencing any proposed changes to U.S. nuclear deterrence strategy, modernization efforts, or the nuclear enterprise writ large.

#### **Future Scenarios**

To provide context to this research and as a baseline for analysis, three scenarios tested the hypothesis and concurrently provided further clarity of the complexities involving threats in the future global security environment. This is primarily because "scenarios are not about predicting the future; rather, they are about perceiving futures in the present."<sup>15</sup>

#### Status Quo but Things are Improving

The United States has ardently remained committed for decades (most recently through the NEW START program) to increase transparency of U.S. and Russian nuclear weapons programs, reduce the number of weapons in each nation's arsenal, decrease the number of deployed weapons, and reduce the number of launchers accessible. As this program has continued to pay dividends and the United States and Russia remain on trajectory to meet prescribed obligations by 2021, initiation of NEW START II, though optimistic, is realistic and supports this scenario.

Implementation of a spin-off accord between the United States and Russia that provides additional transparency, reduction in available arsenals and deployed weapons, and even restrictions on the type/yield capability of nuclear weapons, is no longer suspect, but rational. In addition, as transparency is a vital component to this type of program, initiating a distinct multilateral program enticing other nuclear weapon states to participate, (such as India and Pakistan), would enhance regional and global security immensely as well as provide a modicum of economic stability by staving off costs associated with nuclear proliferation efforts by impoverished nations.<sup>16</sup>

China is a key actor in this scenario because although it has continued to modernize its weapon systems and delivery platforms, and pursue advanced technology to support each ideal, these actions continue to exact a huge financial burden. As economic growth continues to be China's primary concern due to an ever-increasing requirement to support a complex and tumultuous domestic agenda, (i.e. its population), it is intuitive for the Chinese to realize that capital spent on their nuclear enterprise equates to capital expended without an expected return on investment. Furthermore, as China is primarily concerned with regional threats and has in its current arsenal a requisite number of nuclear weapons capable of inflicting catastrophic damage to a regional aggressor, this will likely entice China to curtail the use of its national treasure on its nuclear weapons programs in the future. Finally, as is evident, "…small nuclear arsenals, not large ones, are the global norm."<sup>17</sup>

Realizing that regional stability indelibly promotes their agenda of economic growth, China, who in many regards plays the role of a big brother to the DPRK, will also reinvigorate efforts to relaunch the Six-Party talks with the DPRK in an effort to deter ongoing regional belligerence and DPRK attempts at nuclear proliferation. DPRK leadership, for its part, comes to terms with its imminent demise, and rather than implode as a nation begins to normalize relations with regional actors and the west by adhering to international laws and regulations governing nuclear activities.<sup>18</sup>

The relationship between India and Pakistan is another problem set involved in the scenario of a status quo, but things are improving. Though India and Pakistan each have nationalistic animosity seemingly ingrained in their respective DNA, it is possible that relations between the two countries become more stable. As India continues to grow and maintain its status as the world's most populous country, much like China, India's concerns remain committed to economic solvency in order to promulgate a better standard of living for millions of impoverished Indians, not on bolstering its nuclear enterprise, nor warring with Pakistan. This is especially pertinent "...if Indian growth does not rebound from its recent slowdown and India does not put more emphasis on rapid economic and technological development."<sup>19</sup>

Pakistan, for its part, and in concert with the United States and other NATO members, finally expresses a desire to diligently pursue and defeat within its borders safe havens for extremist groups. Though there are serious challenges to overcome, Pakistan is committed to regional stability and "...has a vision of a security architecture for South Asia that seeks to address the sources of insecurity..."<sup>20</sup>

The final two players in this scenario involve Israel and Iran. Israel has not formally declared itself to be in possession of nuclear weapons, but if it was to formally declare its status as a nuclear weapon state, and more importantly declare a policy of no first use, Israel would undoubtedly promote regional stability. In regards to Iran, if its recently denounced aspirations to acquire nuclear weapons via the Iran Nuclear Deal continue to endure, it will also assist in fostering some modicum of reasonable discourse with the West regarding nuclear weapons. Ultimately, "for the first time in nearly a decade, we have halted the progress of the Iranian nuclear program, and key parts of the program will be rolled back."<sup>21</sup>

Finally, to add additional credence to this scenario, it is also likely that subsequent presidential administrations will remain (as in the past) committed to "…a safe, secure, and effective arsenal to deter any adversary, and guarantee that defense to our allies."<sup>22</sup> In part, this equates to funding required modernization of weapons and command and control platforms, and maintaining each leg of the nuclear triad, a key component to maintaining a credible nuclear deterrent.

#### Status Quo but Things are Getting Worse

As discussed in the first scenario where the status quo exists but things are improving, the United States remains committed to transparency and nuclear non-proliferation efforts between itself and Russia. Russia, however, in large part due to security concerns tied to its economic decline, ultimately may not comply with its obligations to the NEW START program and reduce its deployed arsenal, or in the event of compliance, continue its modernization efforts, to include potentially constructing low yield or tactical nuclear devices. Essentially, "…a Russia which fails to build a more diversified economy and more liberal domestic order could increasingly pose a regional and global threat."<sup>23</sup> If this occurred, it would oblige the United States to adjust its current strategy and modernization efforts, to include capability and capacity.

China, for its part, maintains its resolve to gain regional hegemony and bring Taiwan under its control, continues to modernize its nuclear weapons, and further promotes a determined effort at enhancing the global reach of its ballistic missiles. To complicate matters further in the region, China may reduce pressure on the DPRK to begin renegotiating non-proliferation efforts through the Six-Party Talks or other nuclear security summits. This will embolden the DPRK to continue along with its efforts at nuclear weapons proliferation, nuclear weapons testing, and constructing ballistic missiles with a global strike capability, especially as "North Korea sees nuclear weapons as compensation for other political and security weaknesses, heightening the risk of their use."<sup>24</sup>

To further support the scenario of a status quo but things are getting worse, Iran continues to be a key player, though it remains unequipped with nuclear weapons. It is, however, likely that lifting sanctions in accordance with the Iran Nuclear Deal would provide Iran with the opportunity to operate effectively within the global economy and then likely decide to renege on the Iran Nuclear Deal, determining it must proceed with its nuclear weapons program. If Iran were to procure nuclear weapons, being the world's largest sponsor of terrorism, it would in effect, "...set off a mad dash by Saudi Arabia, Turkey, and others to acquire nuclear weapons of their own. The world's most volatile region would become a nuclear tinderbox waiting to go off... worst of all, with nuclear weapons, Iran could threaten all of us with nuclear terrorism."<sup>25</sup> This would thus promote further instability in the region, again affecting the U.S. nuclear posture and consequently supporting this paper's hypothesis.

Although India and Pakistan remain committed to peaceful coexistence and nuclear nonproliferation, due to weak governance, Pakistan remains effectively a protectorate for a multitude of extremist organizations and therefore advancing the likelihood of nuclear terrorism stemming from South Asia. In addition, "if future state-on-state conflicts occur, they will most likely involve multiple forms of warfare. Future wars in Asia involving Russia, China, or India and Pakistan would risk use of a nuclear weapon in addition to conventional military capabilities."<sup>26</sup>

Still another appropriate consideration in examining this scenario concerns the US ability to maintain all three legs of the nuclear triad. For years, various legislators and critics of the nuclear triad have presented arguments that there is virtually no need for each leg of the triad; the United States possesses a credible deterrent with only one or two legs, and it would be an immense cost savings by decommissioning one or more legs. With the effects of a downturn in the global economy, and the potential for another budget control measure instituted by Congress, severing any leg of the triad would result in an overall degradation of the entire nuclear enterprise, therefore requiring a radical adjustment to the current U.S. nuclear posture and strategy.

#### Occurrence of a Game-Changing Event

Findings show that truly game-changing events, although somewhat unlikely, in the context of this research require particular consideration as its influence will weigh heavily on the premise that the strategy, modernization efforts, and force structure of the nuclear enterprise must adapt and maintain the ability to deter current and emerging threats in the next 20 years.

In examining the possibility of game changing events, research indicated that the three most probable include introduction of new technology, the occurrence of an unforeseen regime change in a nuclear state, and the occurrence of a black swan event, such as the invention of a new weapon or technology that renders the U.S. nuclear enterprise or its posture obsolete.<sup>27</sup>

Regarding the introduction of new technology and its game-changing potential, this would include technological advances in hypersonic weapons as well as, "...nanotechnology directed energy, unmanned systems, and artificial intelligence (AI)."<sup>28</sup> Ultimately, the promulgation of either of these technologies in a mature or employable capacity by adversaries is a truly game-changing occurrence due to susceptibility of attack and potential vulnerability of the U.S. nuclear enterprise. Again, this finding lends credence to the hypothesis that the strategy, modernization efforts, and force structure of the U.S. nuclear enterprise must adapt and maintain the ability to deter current and emerging threats.

As alluded to previously, an unforeseen regime change of a nuclear state is undoubtedly a game-changing event. Depending upon in which nuclear state a regime change occurs, a new government that is ambivalent in its strategy towards use of nuclear weapons, or a nation that is simply hostile to U.S. intentions, will undoubtedly affect U.S. strategic nuclear deterrence posture efforts.

Introduction of a black swan event as a game-changing occurrence is yet another topic of discussion relevant to this scenario and the overall hypothesis. Per definition, black swan events are theoretically unpredictable, but such an event is also reasonable to introduce due to its profound effects. For example, introducing a previously unknown technology to counter or defeat the use of nuclear weapons would decisively influence the US nuclear posture and lend credibility to the fact that the U.S. nuclear enterprise must adapt to deter current and emerging threats.

#### Conclusion

As the above findings have revealed, numerous factors including the inescapable though relatively unknown complexities of the future global security environment, as well as intricacies involving each scenario, undoubtedly support the hypothesis that strategy, modernization efforts, and force structure of the nuclear enterprise must adapt and maintain the ability to deter current and emerging threats in the next twenty years.

The purpose of this research was to examine in detail the complexity of current and future threats to effective nuclear strategic deterrence posture and analyze how these threats affect the US nuclear enterprise from its ability to successfully assure allies and deter belligerence from a host of regional and global actors.

As this research has shown, the variables utilized to conduct this analysis intending to either prove or refute the hypothesis proved beneficial in determining the outcome that actions by numerous key actors, to include four of the eight nuclear weapon states (and one undeclared state), exacerbate complexity in the future security environment, and influence U.S. nuclear strategic deterrence posture. In addition, utilizing the three dissimilar scenarios assisted in further deliberation whereby each provided insight into just how culpable the US nuclear strategic deterrence posture is to a vast array of likely factors from even an optimistic outlook of the future.

As examined, Russian intentions also weighed heavily on the outcome of this research. Though the Cold War is long over and Russia continues its slow relative decline in the global economy, they also aspire to remain globally significant. With its recent actions in Crimea, the Ukraine and Syria, and its ongoing efforts at nuclear modernization, ultimately, "…a Russia which fails to build a more diversified economy and more liberal domestic order could increasingly pose a regional and global threat."<sup>29</sup>

To make matters even more concerning, political and economic instability, and security constraints remain a large part of this calculus. As such, "nuclear powers such as Russia and Pakistan and potential aspirants such as Iran and North Korea see nuclear weapons as compensation for other political and security weaknesses, heightening the risk of their use."<sup>30</sup>

As history has also shown, an overmatch and increase in both conventional and nuclear capabilities will inevitably promulgate assertive behavior, in this case on behalf of China, and lead to the inevitability of conflict with other key actors, to include Russia. Without another major global economic downturn affecting China's economy, (inarguably the center of gravity to its ability to enhance its nuclear enterprise), deterrence efforts will need to be adjusted or China will likely continue their rapid move toward regional hegemony and enhancement of their own nuclear surety. As the United States continues to rebalance to the Asia-Pacific region, this is cause for alarm, supporting the argument that the strategy, modernization efforts, and force structure of the nuclear enterprise must adapt and maintain the ability to deter current and emerging threats in the next 20 years.

In regards to China's antagonistic little brother, the DPRK, absent the sudden demise of its current leader and a turn-around of the country's totalitarianism ways, its ongoing status as a nuclear-armed belligerent will remain on its current trajectory as international sanctions seem to further embolden their population, harden their leadership, and prove ineffective at stopping nuclear proliferation efforts. This leads to further reliability of the thesis that the strategy, modernization efforts, and force structure of the nuclear enterprise must adapt.

As examination of the dependent and independent variables have shown, there are many avenues of future research available to scholars who wish to explore in more detail the complexity of future threats to effective nuclear strategic deterrence. At a minimum, these could include a detailed examination of current U.S. nuclear deterrence strategy and potential shortfalls, or examination of additional game-changing technologies and potential black swan events and their potentially catastrophic influence on U.S. nuclear surety.

In summation, though this paper validated the hypothesis and the future threats to nuclear strategic deterrence are growing alongside the potential for proliferation of nuclear weapons, eventually all affected parties must be prescient of the fact that "it is impossible to certify when deterrence is effective, only when it is not. If a war does not occur, how can anyone tell whether it was deterred or what means deterred it?"<sup>31</sup>

#### NOTES:

<sup>2</sup> Globalization is defined here as an increasing rapid flow of ideas, information and money.

<sup>3</sup> U.S. Department of Defense. *Joint Operating Environment 2010* (Washington, DC: U.S. Department of Defense, February 2010), p. 44.

<sup>4</sup> Ibid., p. 50.

<sup>5</sup> National Intelligence Council, *Global Trends 2030: Alternative Worlds* (Washington, DC: Office of the Director of National Intelligence, 2012), p. viii.

<sup>6</sup> Office of the Director of National Intelligence, National Counter-Proliferation Center, *A Closer Look Inside the National Counter-Proliferation Center*, p. 3. Available at: https://www.dni.gov/index.php/about/organization/national-counterproliferation-center-who-we-are

<sup>&</sup>lt;sup>1</sup> Bernard Brodie, *Strategy in the Missile Age* (Santa Monica: RAND Corporation, 2007), p. viii.

<sup>7</sup> Posture is defined by Narang in *Nuclear Strategy in the Modern Era: Regional powers and International Conflict* as "The incorporation of some number and type of nuclear warheads and delivery vehicles into a state's overall military structure, the rules and procedures governing how those weapons are deployed, when and under what conditions they might be used, against what targets, and who has the authority to make those decisions." Vipin Narang, *Nuclear Strategy in the Modern Era: Regional Powers and International Conflict* (Princeton, New Jersey: Princeton Press, 2015), p. 4.

<sup>8</sup> "The purpose of scenarios is to help yourself change your view of reality to match it up more closely with reality as it is, and reality as it is going to be." Peter Schwartz. *The Art of the Long View* (New York, NY: Crown Publishing Group, 1996), p. 9.

<sup>9</sup> U.S. Department of Defense. *Joint Operating Environment 2035* (Washington, DC: U.S. Department of Defense, 2016), 4.

<sup>10</sup> Ibid., p. 25.

<sup>11</sup> Ibid.

<sup>12</sup> Ibid.

<sup>13</sup> Ibid., p. 6.

<sup>14</sup> Ibid., p. 6.

<sup>15</sup> Peter Schwartz, *The Art of the Long View* (New York, NY: Crown Publishing Group, 1996), p. 36.

<sup>16</sup> This would be a natural progression of enduring US efforts at non-proliferation and attempts to further enhance the transparency of weapons programs between the United States and Russia.

<sup>17</sup> James Forsyth, Jr., "The Common Sense of Small Nuclear Arsenals." *Strategic Studies Quarterly*, Summer 2012, p. 93.

<sup>18</sup> Derived from Haynes, Susan T. "China's Nuclear Threat Perceptions." *Strategic Studies Quarterly*, (Summer 2016). p. 30.

<sup>19</sup> National Intelligence Council, *Global Trends 2030: Alternative Worlds* (Washington, DC: Office of the Director of National Intelligence, 2012), p. 75.

<sup>20</sup> In a comprehensive security analysis of the region, former Ambassador of Pakistan to the US describes the vision as four main pillars. These include, "Nuclear and missile restraint by Pakistan and India; an agreement for conventional arms control in South Asia; peaceful resolution of all outstanding disputes and sources of tension, especially Kashmir; and economic and social revival of South Asia through regional cooperation and global integration, in order to address problems of poverty and deprivation." Available at:

http://www.defencejournal.com/2002/march/security.htm

<sup>21</sup> President Obama, delivered at the White House, November 23, 2013. Available at: https://www.whitehouse.gov/the-press-office/2016/01/17/statement-president-iran

<sup>22</sup> President Obama in Prague, Czech Republic, April 5, 2009. Available at: https://www.whitehouse.gov/the-press-office/remarks-president-barack-obama-prague-delivered

<sup>23</sup> National Intelligence Council, *Global Trends 2030*, p. ix.

<sup>24</sup> Ibid., p. x.

<sup>25</sup> Benjamin Netanyahu's address to the American Israel Public Affairs Committee, Washington, DC, March 6, 2012. Available at: https://israeled.org/resources/documents/israeliprime-minister-benjamin-netanyahu-addresses-aipac/

<sup>26</sup> National Intelligence Council, *Global Trends 2030*, p. 67.

<sup>27</sup> A black swan event is defined here as an event that occurs which is completely unpredicted and causes massive consequences, in this case to the status quo of the US nuclear enterprise and US nuclear posture.

<sup>28</sup> Deborah Lee James and Gen Mark A. Welsh III, *Air Force Future Operating Concept, a View of the Air Force in 2035* (Washington DC: Dept of the Air Force, 2015), p. 17.

<sup>29</sup> National Intelligence Council, *Global Trends*, p. ix.

<sup>30</sup> Ibid.

<sup>31</sup> Sam J. Tangredi. "All Possible Wars? Toward a Consensus View of the Future Security Environment, 2001–2025," McNair Paper 63 (Fort McNair, DC: Institute for National Strategic Studies, 2000), p. 27.

### **CHAPTER 2**

## NPR Next: Strategy For 2040

Cassandra Bates, Major, United States Air Force

"I have not seen any good analysis of why a world without nuclear weapons would be safer than a world with some nuclear weapons. Even if a nuclear state were to give up its weapons, it is bound to be able to recreate them fairly quickly if needed. That is an unstable situation requiring substantial investments in intelligence and monitoring to ensure no nation is trying to get a jump on its non-nuclear neighbors. Governments would be much more nervous about the possibility of nuclear war than they were in the age of stable deterrence between superpowers."

-Thomas Schelling<sup>1</sup>

The international security environment has changed dramatically since 2010, and as such, the United States needs to update its policies regarding security and the nuclear posture for the future. First and foremost, the prominent recommended change to this Nuclear Posture Review (NPR) proposal from the previous 2010 NPR is the removal of the impractical verbiage surrounding "global zero" advocated by President Obama and his administration. History has shown that life before nuclear weapons was wrought with death and conflict; so, it is therefore illogical to want to return to that former state of barbarism and brutality.<sup>2</sup> Nuclear weapons are here to stay, and with that, comes extreme responsibility and a tremendous obligation for safe keeping and use.

Secondly, in an effort to stay ahead of our security environment, this paper will advocate a slight change to the future strategy for America's nuclear arsenal. The strategy will remain one of deterrence; however, based on the projected threats and future operating environment facing the United States and our allies, this paper proposes an expanded and more efficient use of our current nuclear stockpile. According to the Arms Control Association, the United States has an estimated 4,500(+) warheads assigned for

potential use on military delivery vehicles, 1,350(+) warheads deployed to our allies, and approximately 2,500 warheads no longer in the stockpile, but intact as they await dismantlement.<sup>3</sup> Rather than leave these expensive weapons to deteriorate, we will analyze the possibility of diversifying their purposes to better enable the nuclear umbrella of protection.

The United States should expand the future role of nuclear weapons to include a less than lethal option because it broadens the range of alternatives available to the President. The United States should also refrain from openly committing to any one policy (i.e., no first use) because it ties our hands and makes our actions more predictable.

#### **Findings and Analysis**

As a nuclear power – as the only nuclear power to have used a nuclear weapon – the United States has a moral responsibility to act. - President Barack Obama

Nuclear weapons are one component of an integrated defense strategy that includes diplomacy and conventional forces. The principal role of nuclear weapons was, and continues to be, that of deterring any potential adversaries from an attack on America, our allies, or vital interests. This role is expected to continue for as long as nuclear weapons hold the designation of supreme instruments of military power. However, this does not mean that their role in military planning will not change. Changes in the geopolitical environment around the world suggest that the position of nuclear weapons in national security policy will evolve with the times. "Nuclear weapons are unique in their capacity to inflict instant loss of life on a massive scale."<sup>4</sup> The uniqueness of nuclear weapons to pack an incredible destructive force into a small, deliverable package makes them the ideal deterrent.

But, not all nuclear weapons have to inflict instant loss of life on a massive scale. A high altitude nuclear detonation can generate an electromagnetic pulse (EMP) that has the potential to damage or destroy electronic devices over widespread areas. When "detonated," an EMP weapon produces a pulse of energy that creates an electromagnetic field more powerful than lightning, capable of short-circuiting a wide range of electronic equipment, particularly computers, satellites, radios, radar receivers and even civilian traffic lights.<sup>5</sup> Since EMP is electromagnetic energy traveling at the speed of light, all of the vulnerable electronic equipment in the detonation zone could be affected simultaneously. With modern societies being more dependent upon technology than in the past, this repurposed use of nuclear weapons could make a devastating and demoralizing blow to the economy of our enemies, without the carnage of previously-used nuclear weapons.

A nuclear weapon used as an EMP would turn a weapon of mass destruction into a less than lethal option, and thus would give a dual purpose to a previously mass lethal instrument. On the use of force continuum, nuclear weapons have always been preserved as the last resort option for deadly/lethal force.<sup>6</sup> This new and expanded role broadens the range of options available to the President. It also

would mean that no new conventional weapons or platforms would need to be created to have this capability.

The National Defense Authorization Act of 2013 required the Congressional Budget Office (CBO) to estimate the 10-year cost of the Administration's plan to operate, maintain, and modernize U.S. nuclear forces.<sup>7</sup> "CBO estimates that over the 2015-2024 period, the Administration's plans for nuclear forces would cost approximately \$348 billion over the next decade, an average cost of about \$35 billion a year."<sup>8</sup> While the price tag of \$35 billion a year sounds like a hefty expense, that is only five to six percent of the plans for national defense spending and it is pretty arguable that for what we are getting in return, the hefty price tag is well worth it. One can further argue that by expanding the role of these nuclear weapons, we are making more efficient use of our money/budget by not having to create more conventional weapons.

President Trump tweeted, "The United States must greatly strengthen and expand its nuclear capability until such a time as the world comes to its senses regarding nukes."<sup>9</sup> The social media storm that followed would make you think that he is wanting to start World War III, but the president is right. As the world continues to get more dangerous, the United States must modernize and expand its nuclear capability. The new intercontinental ballistic missiles, bombers, and submarines are cheap relative to the security benefits they provide to the nation. After all, nuclear weapons are the only existential threat to the United States. If one thinks that nuclear weapon modernization is costly, just wait until they see the cost of failed deterrence – if anyone is still around to witness that deadly cost. While it is true that fiscal resources are finite, sound strategic planning should start with an assessment of threats and capabilities. Based on those estimates, the United States must prepare a budget and, if need be, make tradeoffs in a way that maximizes the chances of being successful in the most probable contingencies, while also hedging against the most dangerous contingencies. The simple fact is the United States must spend sufficiently to ensure adversaries are deterred from attacking the United States with nuclear weapons. We also need to assure our allies (and interests) that the American nuclear umbrella remains credible. If providing such survivability were to cost a trillion dollars, it would still prove worthwhile and a minor investment when compared to many other expenditures of the federal government. For example, the average American spends 10.3 percent of their annual income on insurance, while the federal government spends less than one percent of the federal budget on nuclear weapons – the ultimate insurance policy.<sup>10</sup>

Before one can rationally discuss future needs, it is necessary to know what one is defending against. The past decade demonstrated the difficulty of predicting the geopolitical future, but there are some forecasts that can be made with reasonable confidence and which can be used as a guide. Trends evident today suggest that by 2030, many countries in the world will have access to several important technologies.<sup>11</sup> More and more, not only the United States but other peer competitors, such as Russia and China, have a heavy dependence on technology. One could argue that technology has become an Achilles heel for all countries with thriving economies.

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Fast-forward to present day and we have to ask ourselves, are we a modernday Tokyo? Are our super power peers a modern-day Tokyo? Our infrastructure is basically protected by postmodern construction materials and highly susceptible to EMP attack, which makes this potential weapon all the more dangerous, albeit, not as life threatening. The Sept. 11 attackers went after a military target (the Pentagon) and an economic one (the World Trade Center). In addition, most U.S. military bases are connected to civilian electricity grids, as are any economic targets; an interdependency that is well known as a center of gravity (COG). "Over time, and in step with energy market moves, China, Russia, and the United States will each individually attempt to bend their energy advantages to strategic ends."<sup>13</sup>

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A few considerations will have to be made when deciding to expand the current role of our nuclear stockpile. One of those considerations is the effects of the fallout from an EMP burst. There is limited data on this, since both atmospheric testing and high-altitude nuclear testing was banned in 1963.<sup>16</sup> A majority of what we do know comes from the 1962 STARFISH PRIME test and the last three Soviet tests. "When the U.S. detonated the 1.4-megaton STARFISH PRIME device on 09 July 1962 at 400km altitude, a total of 24 satellites were in orbit or were launched in weeks following... at least eight satellites suffered damage that was definitely related to the STARFISH PRIME event."<sup>17</sup> The Telstar was a communications satellite that was launched one day after the STARFISH PRIME nuclear explosion. About one month after its launch, complete failure of the command system occurred. After radiation testing, it was clearly determined

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With these considerations in mind, it is still worth our time to invest in workarounds and solutions to these potential problem sets, in order to utilize these newfound purposes for our nuclear stockpile. Most governments today have a heavy reliance on satellites and commercial computer equipment in order to conduct real-time command and control of forces around the world. Our own Defense Department has this same heavy reliance. It is this aspect of the EMP effect which is of military and political significance. With the ever-present escalation of cyber hacks, nuclear EMPs may very well become the way of the future.

#### Conclusion

Long-term cost predictions for the nuclear arsenal cannot account for unexpected change in the strategic environment. Such changes are often unexpected and lead to a dramatic shift in requirements and demands placed on the nuclear forces. Few people would have begun 2014 predicting that Russia would invade and annex Crimea. It is important to maintain a sense of humility and caution when advocating further reductions in the nation's nuclear arsenal because future strategic surprises may be both sudden and unpleasant and may require the United States to spend significantly more on its nuclear arsenal in order to maintain stability. Unlike the conventional capabilities, the nuclear force cannot be quickly expanded to meet demands of a changing strategic environment. For that reason, this paper has offered the rationale as to why the concept and verbiage about "global zero" needs to be removed from future posture reviews.

History has shown that life before nuclear weapons was wrought with death and conflict; and if called upon again to prevent that death and conflict, the U.S. nuclear arsenal needs to be ready.<sup>21</sup> So long as there are nuclear weapons in the world, or the possibility of making them, then the United States must maintain and care for the nuclear weapons we currently have. Part of that responsibility means looking well into the future at potential threats on the horizon, realizing there will always be unknowns, and then maximizing what is available to us by not committing to any one policy or tying the hands of our President. The modernization and repurposing of this force will be costly and there will be challenges that need to be worked through, but the ultimate survivability of this country and our allies, through the increased umbrella of protection, is worth every penny.

#### **NOTES:**

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### **CHAPTER 2**

## NPR Next: Strategy For 2040

Cassandra Bates, Major, United States Air Force

"I have not seen any good analysis of why a world without nuclear weapons would be safer than a world with some nuclear weapons. Even if a nuclear state were to give up its weapons, it is bound to be able to recreate them fairly quickly if needed. That is an unstable situation requiring substantial investments in intelligence and monitoring to ensure no nation is trying to get a jump on its non-nuclear neighbors. Governments would be much more nervous about the possibility of nuclear war than they were in the age of stable deterrence between superpowers."

-Thomas Schelling<sup>1</sup>

The international security environment has changed dramatically since 2010, and as such, the United States needs to update its policies regarding security and the nuclear posture for the future. First and foremost, the prominent recommended change to this Nuclear Posture Review (NPR) proposal from the previous 2010 NPR is the removal of the impractical verbiage surrounding "global zero" advocated by President Obama and his administration. History has shown that life before nuclear weapons was wrought with death and conflict; so, it is therefore illogical to want to return to that former state of barbarism and brutality.<sup>2</sup> Nuclear weapons are here to stay, and with that, comes extreme responsibility and a tremendous obligation for safe keeping and use.

Secondly, in an effort to stay ahead of our security environment, this paper will advocate a slight change to the future strategy for America's nuclear arsenal. The strategy will remain one of deterrence; however, based on the projected threats and future operating environment facing the United States and our allies, this paper proposes an expanded and more efficient use of our current nuclear stockpile. According to the Arms Control Association, the United States has an estimated 4,500(+) warheads assigned for

potential use on military delivery vehicles, 1,350(+) warheads deployed to our allies, and approximately 2,500 warheads no longer in the stockpile, but intact as they await dismantlement.<sup>3</sup> Rather than leave these expensive weapons to deteriorate, we will analyze the possibility of diversifying their purposes to better enable the nuclear umbrella of protection.

The United States should expand the future role of nuclear weapons to include a less than lethal option because it broadens the range of alternatives available to the President. The United States should also refrain from openly committing to any one policy (i.e., no first use) because it ties our hands and makes our actions more predictable.

#### **Findings and Analysis**

As a nuclear power – as the only nuclear power to have used a nuclear weapon – the United States has a moral responsibility to act. - President Barack Obama

Nuclear weapons are one component of an integrated defense strategy that includes diplomacy and conventional forces. The principal role of nuclear weapons was, and continues to be, that of deterring any potential adversaries from an attack on America, our allies, or vital interests. This role is expected to continue for as long as nuclear weapons hold the designation of supreme instruments of military power. However, this does not mean that their role in military planning will not change. Changes in the geopolitical environment around the world suggest that the position of nuclear weapons in national security policy will evolve with the times. "Nuclear weapons are unique in their capacity to inflict instant loss of life on a massive scale."<sup>4</sup> The uniqueness of nuclear weapons to pack an incredible destructive force into a small, deliverable package makes them the ideal deterrent.

But, not all nuclear weapons have to inflict instant loss of life on a massive scale. A high altitude nuclear detonation can generate an electromagnetic pulse (EMP) that has the potential to damage or destroy electronic devices over widespread areas. When "detonated," an EMP weapon produces a pulse of energy that creates an electromagnetic field more powerful than lightning, capable of short-circuiting a wide range of electronic equipment, particularly computers, satellites, radios, radar receivers and even civilian traffic lights.<sup>5</sup> Since EMP is electromagnetic energy traveling at the speed of light, all of the vulnerable electronic equipment in the detonation zone could be affected simultaneously. With modern societies being more dependent upon technology than in the past, this repurposed use of nuclear weapons could make a devastating and demoralizing blow to the economy of our enemies, without the carnage of previously-used nuclear weapons.

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<sup>19</sup> Eugene L. Patrick and William L. Vault, *Bioelectromagnetic Effects of the Electromagnetic Pulse*, May 1990, pp. 6-12. This paper was very helpful in distinguishing the difference between EMP simulators which produce high-level radiation versus radiation that is pulsed at high repetition rates (many pulses per second). With that being said, there are crucial differences between these types of radiation tests to keep in mind.

<sup>20</sup> Ibid.

<sup>21</sup> Dan Caldwell and Robert E. Williams Jr, *Seeking Security in an Insecure World*, (Maryland: Rowman & Littlefield, 2016), pp. 25-26
### CHAPTER 4

# Tailored Deterrence: Building a Framework for Extended Deterrence in Developing Threat Regions

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The 2016 U.S. presidential election repeatedly emphasized a national concern over the "Iran deal" and the implications of a nuclear-armed Iran. At the same time, the U.S. nuclear umbrella is notably absent from the Middle East, while concern and tensions in the region continue to rise based on the perceived Iranian threat and the potential proliferation of nuclear technology throughout the region. The Joint Comprehensive Plan of Action (JCPOA), known as the "Iran deal," is a multinational agreement that effectively removes United Nations (UN) Security Council sanctions against Iran and enables them to reemerge as a regional power within the Middle East, but slows their nuclear progress.<sup>1</sup> The JCPOA has generated strong opinions both supporting and denouncing the agreement.

Additionally, the United States currently extends a form of nuclear deterrence within both the North Atlantic Treaty Organization (NATO) and throughout the Western Pacific region, as potential deterrence models to tailor and/or specialize for use in the Middle East. The following paper will recommend a limited or tailored version of extended deterrence (starting with conventional deterrence) in the Middle East should the JCPOA fail to maintain peace and stability in the region. In the end, "even one new nuclear weapons country could create a catastrophic cascade of proliferation. With each new nuclear country the existing balance of regional and global security would be upset and the world would grow more unsafe."<sup>2</sup> Finally, while there are compelling reasons to continue this discussion, this paper argues that the current sociopolitical and military threat situation in the Middle East does not support, facilitate, nor necessitate the implementation of a new nuclear security guarantee with the Gulf Coast allies.

The United States maintains a nuclear stockpile to deter adversaries and assure allies.<sup>3</sup> Extended deterrence is the exported version of nuclear brinkmanship used to deter and assure regional adversaries and allies. The United States has pledged extended deterrence to its NATO allies, to provide a regional deterrence from Russian aggression, and to Western Pacific allies (Japan, South Korea, and Australia), to deter communist aggression in the region.<sup>4</sup> The employment of extended deterrence is significantly different in the two regions and offers a starting point for researching and developing additional tailored models for use in other regions. While extended deterrence seeks to both deter and assure, the value of each independently is questionable and likely different between NATO and the Pacific. As applied to the Middle East, adversaries and allies are examined on the ability to either deter or assure. Peripheral questions that must be answered before a determination is made to extend the nuclear umbrella to the Middle East are:

- Can Iran be effectively deterred?
- Can the Gulf Cooperation Council (GCC) be effectively assured?
- Morally, does non-proliferation trump the moral virtue of representative governments?

The answers to these questions will assist policy makers in determining any future nuclear deterrent in the Middle East.

While the Joint Comprehensive Plan of Action (JCPOA) and the U.S. election season highlighted the lack of a declared U.S. nuclear deterrent in the Middle East, the current sociopolitical and threat environment within the region does not support, facilitate, nor necessitate the implementation of a new nuclear security guarantee. The United States has a long history of supporting and promoting democracy; providing the nuclear umbrella to the monarchies of the Middle East would undermine the principles and historical virtue of American values.

### **Findings and Analysis**

### Extended Deterrence in NATO

The North Atlantic Treaty Organization (NATO) was officially created with the signature of the North Atlantic Treaty, or Washington Treaty, on 4 April, 1949.<sup>5</sup> NATO was created as a collective security agreement between the original 12 nations (Belgium, Canada, Denmark, France, Iceland, Italy, Luxembourg, the Netherlands, Norway, Portugal, the United Kingdom, and the United States).<sup>6</sup> The U.S. nuclear umbrella has been an integral part of European security since before ratification of the Washington Treaty as President Truman extended deterrence with B-29s during the Berlin Blockade of 1948-49.<sup>7</sup> As such, NATO is the most comprehensive, developed, and longest lasting form of extended deterrence, which makes it a starting point for any discussions on extended deterrence or tailored forms of deterrence.

At the foundation, "NATO promotes democratic values and encourages consultation and cooperation on defense and security issues to build trust and, in the long run, prevent conflict."<sup>8</sup> Emphasizing the importance of democracies in relation to employment of nuclear weapons, on April 6, 1949, President Truman stated: "…if it [a decision to use the atomic bomb] has to be made for the welfare of the United States, and the democracies of the world are at stake, I would not hesitate to make it again."<sup>9</sup> The U.S. support of NATO is underpinned by the democratic requirements to have a representative government before a country is invited to join the treaty.

U.S. extended deterrence to NATO was aimed at preventing the spread of communism through an overwhelming conventional attack from the Soviet Union. The Soviet Union was far too powerful for the conventional forces in Western Europe and could only be stopped through a credible nuclear presence. However, the U.S. nuclear presence in NATO has certainly complicated the relationships between Moscow, Washington, and NATO throughout the Cold War. Faced with budget issues, President Eisenhower adopted the Massive Retaliation policy with Secretary of State Dulles' announcement that "The way to deter aggression is for the free community to be willing and able to respond vigorously at places and with means of its own choosing... the deterrent of massive retaliatory power."<sup>10</sup> This led to a back and forth struggle between the United States and NATO regarding nuclear presence and U.S. troop levels on the European front with the Soviet Union. Later, the Cuban Missile Crisis was flamed and complicated by the presence of U.S. nuclear weapons in Turkey and resulted in a quid pro quo removal of weapons from both Cuba and Turkey.<sup>11</sup> Additionally, and more recently, the attempted coup in Turkey in August of 2016 had news reporters wildly debating the safety and security of nuclear weapons assumed to be vulnerable inside of Turkey.<sup>12</sup> Ultimately, the location or security of U.S. nuclear weapons in NATO is outside the scope of this paper, but unrest in Turkey and the renewed aggression against Crimea and the Ukraine from Russia certainly cause concern. While extended deterrence to NATO has been a bedrock of the security cooperation and critical to communist containment, there is more to explore.

Extended deterrence is about more than deterring an adversary. Extended deterrence is also intended to assure allies and prevent the proliferation of nuclear weapons. In the case of NATO, the Soviet Union was deterred, but the allies were not always assured. Since the creation of the organization and the extension of the U.S. nuclear umbrella, both the United Kingdom and France have created independent nuclear capabilities. U.S. response to the French request for nuclear weapons at Dien Bien Phu in 1954 and the Suez Crisis in 1956 virtually guaranteed that France would create an independent nuclear stockpile.<sup>13</sup> The

United Kingdom detonated their first atomic bomb in 1952 and France later detonated a device in 1960, despite security guarantees from the U.S. president.<sup>14</sup> There are several likely reasons that France sought an independent nuclear capability, but most revolve around U.S. credibility as an ally, the U.S. commitment to Europe, and French pride.<sup>15</sup>

Ultimately, within NATO, the United States is assuring an alliance of stable liberal democracies and has successfully deterred major combat operations and nuclear attack from Russia, despite shortcomings in assurance and non-proliferation. The defense of the democracies of the world was the driving force behind President Truman's decision to extend the U.S. nuclear umbrella. U.S. capability and credibility was enough to deter the Soviets; however, U.S. credibility as an ally was insufficient to assure France and prevent them from creating an independent nuclear force. Many of these factors are currently at play in the Middle East, except the countries in question are not the democracies of the world.

### Extended Deterrence in the Western Pacific

The Western Pacific is a much more complicated system of bilateral security agreements from the United States to the individual nations of Japan, the Republic of Korea (ROK), and Australia. For the sake of space, this paper will focus mainly on the U.S.-ROK agreement and the extended nuclear deterrence that accompanies the agreement. In the wake of the Korean War, the United States sought to support the democratic government of the ROK against the Soviet-backed communist threat from the north. In 1953, Secretary of State Dulles stated, "We do not make the mistake of treating Korea as an isolated affair. The Korean War forms one part of a worldwide effort of communism to conquer freedom."<sup>16</sup>

Overall, the Western Pacific is very different from NATO. The diverse sociopolitical and cultural variables have prevented a collective security agreement among the democratic nations in the Pacific, despite U.S. Senate desires.<sup>17</sup> The closest arrangement in the Pacific is the Association of South East Asian Nations (ASEAN), but the collective agreement is significantly limited in comparison to NATO. ASEAN member states are: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam. Formed through the Treaty of Amity and Cooperation in Southeast Asia, ASEAN's fundamental principles are:

- Mutual respect for the independence, sovereignty, equality, territorial integrity, and national identity of all nations;
- The right of every State to lead its national existence free from external interference, subversion or coercion;
- Non-interference in the internal affairs of one another;

- Settlement of differences or disputes by peaceful manner;
- Renunciation of the threat or use of force; and
- Effective cooperation among themselves.<sup>18</sup>

While ASEAN does not contain any nation-states that are currently under the U.S. nuclear umbrella, the non-intervention cultural mentality and independent ambitions displayed in ASEAN principles can be expanded to encompass most of the region.

Aside from the difference in bilateral versus collective security agreements between the United States and the Pacific allies, the method of providing extended deterrence is different or tailored to the environment. In NATO, nuclear weapons are stored in NATO host nations, controlled by U.S. forces, and employed by NATO partners.<sup>19</sup> In the Pacific, the United States does not have any nuclear weapons. Extended deterrence is provided through a proclamation, without any physical weapons. Displays of U.S. resolve are accomplished through Bomber Assurance and Deterrence (BAAD) missions and the presence of U.S. forces in and around the area. Presentations by U.S. Air Force top brass highlight that the extended deterrence in the Pacific is far more centered on assurance than deterrence.<sup>20</sup>

While North Korea rattles sabers and gathers international recognition as a wild card, many question whether North Korea has a rational government that can be deterred. Repeated threats, agreements, and U.S. posturing failed to prevent North Korea from pursuing, developing, and testing nuclear weapons.<sup>21</sup> Now, with North Korea as an established nuclear state, the U.S. extended deterrence model must continue to focus on assuring allies and preventing a flurry of nuclear proliferation throughout the region.

Like NATO, extended deterrence in the Western Pacific was founded on the basis of supporting democracies and preventing the spread of communism. Unlike the NATO arrangement, the United States does not maintain a nuclear stockpile within any of the Pacific nations. With this model of tailored deterrence, the United States has successfully assured allies enough to keep them from developing their own independent nuclear force, but has been unable to deter the continued pursuit and development of nuclear technology by North Korea. Ultimately, the Pacific model of tailored extended deterrence highlights that forward troop deployments, in this situation, have successfully deterred communist aggression and prevented a hostile takeover of the ROK, even after North Korea became a recognized nuclear state.

### The Threat from Iran

In many ways, Iran has behaved like North Korea. Iran has resisted the western world and retreated into isolationism. In general, Iran has been increasing

its military posture and assertiveness throughout the Middle East.<sup>22</sup> Iran continually denies a military desire for nuclear weapons and asserts its nuclear program is for peaceful purposes, yet it restricted international inspectors from observing and monitoring progress.<sup>23</sup> Iran has covertly worked toward weaponized nuclear technology, at the same time developing long range ballistic missile delivery systems as part of their "mosaic" defense strategy.<sup>24</sup> To a casual observer, there are more parallels and similarities between Iran and North Korea than there are differences. However, the fundamental democracy versus communism struggle that was key to the extended deterrence models in NATO and the Western Pacific is absent.

Tehran ambitions are unclear and open to speculation. One side argues that Iran has always been "aggressive, anti-American, and murderous," but always retreats from severe retaliation.<sup>25</sup> The other side argues that Iran would be emboldened by nuclear weapons and would increase regional assertiveness.<sup>26</sup> Either way, Iran has seemingly backed away from nuclear brinkmanship with the JCPOA. Unless proven otherwise, the United States currently has no imminent nuclear threat to deter; however, that does not imply that the extended deterrence debate and discussion should be sidelined. Ideally, this opens the door for further discussion on alternate forms of deterrence and Robert's tailored deterrence models.

### The Lack of Stable Liberal Democracies

The United States has a long history of cooperation in the Middle East. In 1945, President Roosevelt committed the United States to protecting "Saudi Arabia from external threats, while Saudi Arabia would supply crude oil to meet U.S. energy demands."<sup>27</sup> Since then, the United States has been heavily involved in the region with the Iraq wars, the ousting of the Taliban in Afghanistan, and now the fight against ISIS in both Iraq and Syria. Throughout the past three decades, the United States has maintained a significant footprint and developed strong relationships with the Gulf Cooperation Council (GCC). At the same time, the Middle East has a long history of nuclear ambition. Since the 1960s, there have been four potential nuclear states: Iraq, Iran, Libya, and Syria.<sup>28</sup> Russell's argument that a nuclear Iran could likely spur a regional nuclear arms race has a strong historical foundation that should not be sidelined by the signing of the JCPOA.<sup>29</sup>

The GCC was established in 1981 between Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (UAE) to confront the threat posed by the Iran-Iraq War.<sup>30</sup> While the GCC has been important to the U.S. efforts in the Middle East, tensions between the United States and the GCC, and tensions among the GCC states has limited regional progress. Tensions between Shias and Sunnis, along with tensions "between Muslim regimes that were members of the

Westphalian state system and Islamists who consider statehood and the prevailing institutions of international order an abomination to the Quran," threaten to keep instability and uncertainty within the region for many years to come.<sup>31</sup> Much of this tension revolves around ideological differences between western democracy and the Islamic monarchies of the Middle East.

Unlike NATO or the Western Pacific, the Middle East does not endorse representative governments and does not have a common enemy in communism. The regional tension is between different factions of Islam, with a host of intertwined and overlapping historical disputes. The advent of the Arab Spring in 2011 highlights the fragility of the ruling class of monarchs throughout the Middle East. The rise of ISIS and its quest for an Islamic Caliphate reinforces the challenges and instability within the region that must be addressed before an enduring security agreement can be established.<sup>32</sup> Absent these foundational commonalities, extending the ultimate security guarantee seems unlikely.

Any form of extended nuclear deterrence must have a clearly defined ally and a clearly defined adversary. Extended deterrence must show both a capability and a level of credibility that will both assure allies and deter adversaries. NATO and the Western Pacific are both examples of success and failures of extended deterrence in both the aforementioned categories. In the Middle East, the United States has maintained a presence for three decades without tangible results in assuring allies in the GCC. During the same three decades, Iran has shown little sign of being deterred from interfering with regional stability or in ceasing their nuclear ambitions (aside from the recently signed JCPOA, which is still too new to judge). Ultimately, until there is a common cause and a common enemy (e.g., democracy versus communism), the Middle East does not have any partnerships or alliances strong enough and enduring enough to justify the ultimate security guarantee of nuclear extended deterrence.

### Conclusion

At first glance, the continuous U.S. presence within the Middle East and the perceived nuclear threat from Iran appear as a calling for extended nuclear deterrence agreements with the GCC to stabilize the region and prevent widespread proliferation of nuclear weapons. After a deeper look at the current extended deterrence models employed by the United States, the successes and failures of each, and a review of the sociopolitical environment in the Middle East, it becomes apparent that Iran is unlikely to be deterred, the GCC is unlikely to be assured, the region is unlikely to be stabilized, and the United States should not waiver on a longstanding reputation of supporting stable liberal democracies with a representative government. The Middle East is not ready for an extended nuclear deterrence agreement. Robert's model of tailored deterrence is a step in the right direction, but the foundation to any extended deterrence must be based

on democracy and the right of people to have a voice in their governments. Any other agreements will lack the credibility and historical precedent to assure or deter and will likely fail. The United States should continue to work on regional stability within the Middle East, continue to engage Iranian compliance with the JCPOA, and clarify that the U.S. nuclear shield is only extended to democratic nations. If the GCC is compelled to make significant sociopolitical advances, the discussion of extending the nuclear umbrella can be resumed. In the meantime, the United States should consider adopting new terminology that distinguishes between conventional and nuclear deterrence. While this paper has argued that the U.S. nuclear shield should be reserved for democratic nations, there is an entire escalation ladder that does not include the threat of nuclear employment and does not require the United States to craft binding, long term security agreements.

### **NOTES:**

<sup>1</sup> U.S. Department of State, Joint Comprehensive Plan of Action (Vienna, 2015), p. 2.

<sup>2</sup> Global Zero, *Get the Facts*, available at http://www.globalzero.org/get-the-facts?utm\_source=web&utm\_medium=carousel&utm\_campaign=GZ.

<sup>3</sup> Brad Roberts, *The Case for Nuclear Weapons in the 21st Century* (Stanford, CA: Stanford University Press, 2016), p. 35-36.

<sup>4</sup> Parker Wright, *Bombs and Umbrellas: Defending US Middle East Allies from a Nuclear Armed Iran* (Maxwell AFB, AL: Air University, 2010), p. 77-78.

<sup>5</sup> North Atlantic Treaty Organization, *Key Events*, available at http://www.nato.int/nato-welcome/index.html.

<sup>6</sup> North Atlantic Treaty Organization, *NATO on the Map*, available at http://www.nato.int/nato-on-themap/#lat=51.20738119897003&lon=4.542223838759965&zoom=1&layer-1

<sup>7</sup> Jeffrey Larsen and Kerry Kartchner, *On Limited Nuclear War in the 21<sup>st</sup> Century* (Stanford, CA: Stanford University Press, 2014), p. 50.

<sup>8</sup> North Atlantic Treaty Organization, Key Events.

<sup>9</sup> U.S. Department of State, *Staff Study Prepared by Representatives of the Special Committee of the National Security Council on Atomic Energy*, 1952, available at https://history.state.gov/historicaldocuments/frus1952-54v02p2/d37

<sup>10</sup> Quoted in Wright, Bombs and Umbrellas, p. 17.

<sup>11</sup> Larsen and Kartchner, On Limited Nuclear War, pp. 50-52.

<sup>12</sup> Dan De Luce, "No, the US Is Not Moving Its Nukes From Turkey to Romania" *Foreign Policy*, 2016, available at http://foreignpolicy.com/2016/08/19/no-the-u-s-is-not-moving-its-nukes-from-turkey-to-romania/

<sup>13</sup> Wright, Bombs and Umbrellas, p. 23.

<sup>14</sup> Ibid., 18-19.

<sup>15</sup> Ibid., 32-33.

<sup>16</sup> Quoted in Wright, Bombs and Umbrellas, pp. 77-78.

<sup>17</sup> Ibid., 79.

<sup>18</sup> Association of South East Asian Nations, *Overview*, available at http://asean.org/asean/about-asean/overview/

<sup>19</sup> Larsen and Kartchner, On Limited Nuclear War, p. 259.

<sup>20</sup> Lt Gen Jack Weinstein (Deputy Chief of Staff for Strategic Deterrence and Nuclear Integration, Headquarters U.S. Air Force, Washington, D.C.), in discussion with the author, October 20, 2016.

<sup>21</sup> Wright, Bombs and Umbrellas, pp. 86-87.

<sup>22</sup> Roberts, *The Case for Nuclear Weapons*, p. 56.

<sup>23</sup> Ibid.

<sup>24</sup> Ibid.

<sup>25</sup> Ibid.

<sup>26</sup> Ibid.

<sup>27</sup> Wright, Bombs and Umbrellas, p. 104.

<sup>28</sup> Roberts, The Case for Nuclear Weapons, p. 54.

<sup>29</sup> Russell, Off and Running, pp. 94-99.

<sup>30</sup> Global Security, *Gulf Cooperation Council*, available at

http://www.globalsecurity.org/military/world/gulf/gcc.htm

<sup>31</sup> Henry Kissinger, quoted in Roberts, *The Case for Nuclear Weapons*, p. 57.

<sup>32</sup> Roberts, *The Case for Nuclear Weapons*, p. 57.

## **CHAPTER 5**

# Nuclear Command, Control, and Communications: A New Weapon System; A New Game

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Nuclear Command, Control and Communications (NC3) "is what ties the nuclear enterprise together," according to the Chief of Staff of the Air Force (CSAF), General David L. Goldfein. In a recent Reagan National Defense Forum on non-proliferation and strategic deterrence, General Goldfein said his job is to offer the President time and options if faced with the decision to execute his nuclear force.<sup>1</sup> Without NC3, the President's options are limited while time becomes his or her greatest enemy.

Since 1945, U.S. national security has anchored itself on a nuclear posture thought to be safe, secure and reliable, though at the cornerstone of this deterrent, we have found an un-sustained and weakened network of systems, infrastructure and professionals driven by a lack of modernization, prioritization and resourcing. Following a line of nuclear mishaps in recent years, the nuclear enterprise has been given a welcomed rejuvenation with ample amounts of funds, resources and senior leader emphasis to include a new four star command. But this is little to boast about. Our nuclear enterprise has atrophied for decades creating a "crater of crisis" for funding and resourcing the necessary components that have extended decades past their life expectancies.

As the Department of Defense (DoD) has drafted plans for a new bomber, long range standoff (LRSO) weapon, Ground Based Strategic Deterrent (GBSD) and nuclear submarine, the environment in which each of these platforms are granted permission to employ takes yet again the backseat in prioritization. These weapons, although essential to the United States' national security and our global nuclear deterrent, prove worthless without the granted authority for their release. In the absence of a safe, secure and reliable NC3, the nuclear triad as we know it falls second or third to other nuclear powers rapidly outpacing the United States' modernization efforts. For the United States to best position its nuclear posture, hard decisions must be made in the organizational oversight of NC3. As the Air Force has taken large steps in bettering the sustainment and management process of the NC3 system, the DoD must not overlook how NC3 serves more than just the Air Force's two legs of the triad: to include the Navy's survivable fleet of nuclear submarines; the White House; airborne and ground based support platforms; key military and DoD leaders; and their respective supporting organizations. While looking to modernize, we cannot solely fixate on the enhancement of technologies while speeding past the organizational fallacies that have missed the mark in respect to our nuclear command and control. The forward strides of the Air Force have not been in vain, but NC3 cannot be governed at a level that is unequivocal to those who use it.

Research shows that a safe, secure, and reliable nuclear force rests in the decision to make NC3 a weapon system. Through careful analysis of the Air Operation Center (AOC), critical Joint Publications (JP) and senior leader guidance – including case studies surrounding former nuclear incidents and how the United States employs its nuclear power – the benefits of making NC3 a weapon system are endless. Furthermore, organizational oversight plays a huge role in the success of NC3 and will be discussed in detail. As the reader will see, standardization, prioritization, and value are each key reasons why NC3 becoming its own weapon system is invaluable.

### **Findings and Analysis**

In 2016, the Secretary of the Air Force (SECAF) alongside the Chief of Staff of the Air Force (CSAF) implemented the program action directive (PAD) naming the Air Force Global Strike Command Commander (AFGSC/CC) as the single accountable officer for the Air Force nuclear mission.<sup>2</sup> The PAD also established NC3 as a weapon system charging AFGSC with the organizing, training and equipping (OT&E) of Air Force NC3. As AFGSC/CC, General Rand is responsible for the National Leadership Command Capabilities (NLCC) which will establish OT&E NC3 processes and procedures, though solely for the Air Force.

In 2012, the Navy made similar efforts. Standing up a Task Force Urgent Sentinel established by U.S. Fleet Cyber Command, the Navy positioned itself to address EAM delivery reliability. In December of 2015, the Chief of Naval Operations (CNO) established the NC3 Executive Steering Committee (ESC) giving Navy NC3 a permanent end-to-end governance authority in accordance with (IAW) Operational Naval Instruction (OPNAVINST) 5420.116.<sup>3</sup> As this doesn't identify NC3 as a weapon system per Air Force standards, this instruction now places OT&E under a sole authority for Naval NC3 systems.

In addition to the Air Force and Navy, the National Military Commander Center (NMCC), National Military Command System (NMCS), and the Global Command and Control System (GCCS) were designed to provide a means in which the President of the United States (POTUS), Secretary of Defense (SECDEF) and Joint Chiefs of Staff (CJCS) can exercise their responsibilities. These responsibilities though many, have a priority component to generate "Emergency Action Messages (EAMs) to launch control centers, nuclear submarines, recon aircraft and battlefield commanders worldwide."<sup>4</sup> In 2013, a provision in the House-Senate was being drafted requiring the DoD to establish a special council responsible for the NC3 system. A senior focus inside the Pentagon would be given under the legislation directing a council to include: Vice Chairman of the Joint Chiefs of Staff (CVJCS) & Undersecretary of Defense for Acquisition, Technology and Logistics (USD ATL (Co-Chair)), Undersecretary of Defense for Policy (USD POL), United States Strategic Command (USSTRATCOM), Director of the National Security (NSA) and the Department of Defense Chief Information Officer (DoD CIO). Interviewed in the article by Defense One, Ben Loehrke stated that "U.S. security is only strengthened by improved command and control, which would help decrease the risk of accidents or intrusions and aid in crisis decision-making."<sup>5</sup> This concept is fair, but does little in solving the issues that surrounds the nuclear enterprise.

As such, this creates large gaps and elevated levels of risk in the decision calculus depicted by Colonel John Boyd's OODA (Orient, Observe, Decide, and Assess) Loop. The disruption of a leader's orientation and observation of a situation could be detrimental to the decision that is made regarding the safety, security and reliability of the U.S. nuclear arsenal. Should an adversary have the means and capability to intercept the OODA Loop cycle of the President, or other senior leader decision makers with regards to the employment of nuclear weapons, nuclear deterrence is then no-longer credible. Having a credible capability is more than fancy hardware and large yield weapons. At the core, it is the psychological warfare imposed onto the adversary, creating cause or concern – driven by the will of a nation – who has and will again use its nuclear forces to protect its national security. Influencing, or falsifying the intelligence and communication given to a leader – making the decision to execute his/her nuclear force – can have grave effects and should not be left unprotected, degraded, or mentally stagnant.

Having the Air Force recognize NC3 as a weapon system is certainly positive; yet, it still leaves gaps across the nuclear enterprise. It is assumed that memorandums of understanding and agreements (MOU/MOA) will suffice, providing standardization and prioritization to processes and procedures across the spectrum; however, follow through and upkeep to ensure those relationships are cared for and maintained through different administrations becomes cumbersome and almost impossible. Van Creveld argues that the structure of the organization is just as critical as the system it operates. He states "the more numerous and

differentiated the departments in to which an organization is divided, the larger the number of command echelons superimposed upon each other, the higher the decision thresholds, and the more specialized its individual members, then the greater the amount of information processing that has to go on inside the organization."<sup>6</sup> With the influence of service biases, a vast array of organizational methodologies and a multi-platform/multi-center vortex, the intended or unintended risk of informational cliffs and dead zones are unpredictable. Contrary to Van Creveld's argument, it is impossible to think that elevating NC3 to a Combatant Command (COCOM) level or higher is negative in nature. The risk of information overload is minimal due to advancement in big data technology as it undermines the necessity for central command authority over resourcing and detainment of the NC3 network, infrastructure and personnel. To help understand the process and design of military weapon systems, the DoD acquisition process accurately accounts for and identifies commonalities to ensure the integration of a singular system - adaptable to multiple domains and platforms – when possible.

In 2003, the DoD changed how they identified the war fighter's needs from a threat to a capabilities-based approach. This process, known as the Joint Capabilities Integration and Development System (JCIDS) "identifies, assesses, and prioritizes what capabilities the military requires to fulfill its mission"<sup>7</sup> while addressing these changes through doctrine, OT&E, or the acquisition of a new item (i.e., weapon system). This policy drove the Defense Department away from perceived threats and realigned its efforts "to meet the strategic direction and priorities... set forth in high-level strategy and guidance" derived from the NMS, National Defense Strategy (NDS), and Quadrennial Defense Review (QDR).<sup>8</sup> Schwartz emphasizes the value in the capabilities-based approach [due to] how it helps identify "capability gaps across services instead of each service developing its own response [to the threat]. As a result, weapon systems are expected to be developed jointly among services."<sup>9</sup>

Counter to the policy put in place by the Chairman of the Joint Chiefs of Staff (CJCS), both the Navy and Air Force moved forward independently on identifying separate needs and requirements for NC3. Should a Capabilities Based Assessment (CBA) be conducted – identifying the military's needs and gaps – on the Air Force's NC3 weapon system alone, it would fail to recognize the needs and gaps across the nuclear enterprise as it relates to the Navy, NMCC and other critical nuclear components. Additionally, said gaps and needs are the priorities of both unified and combatant command commanders.<sup>10</sup> In the case that the United States Strategic Command Commander (USSTRATCOM/CC) would need to prioritize his or her requirements, the risk of having a Navy requirement or an Air Force requirement go unfunded, passed over, or delayed could be detrimental to the United States nuclear capability and nuclear deterrence at large.

Organizationally, NC3 must be governed at the correct level by the correct authority; allowing for a more safe, secure and reliable nuclear command and control (NC2). For such robust capability, it is necessary to understand what key elements must be in place. "Nuclear operations are technically complicated and have extremely high political risks with existential consequences"<sup>11</sup> should the information and the communication of that information be left vulnerable to attack or manipulation. To provide the best operating environment, NC3 must have highly-trained personnel and a certified, cross-domain, synergistic network.

Through a standardized approach to NC3, governed at the appropriate level, key priorities will be fielded in maintaining the nuclear arsenal from the perspective of C2 along with system supporting hardware and software. A standardized approach will also bring priority to training and manning within the operational environment of NC3 that will outlast generations of technological shifts and cultural stalemates. This ideology is not foreign and has been birthed in recent years within the Air Force.

In September of 2000, the AOC was officially recognized as the AN/USQ-163 Falconer weapon system.<sup>12</sup> It standardized the "processes involved in operating the AOC weapons system, the equipment that supports it,"<sup>13</sup> as well as a developed CONOPS to meet manning and training requirements Air Force-wide. As such, the NC3 weapon system would provide similar benefits and value; extended beyond the system itself to the people who operate it. As an Air Force designated weapon system, NC3 has already been allotted a Program Executive Officer (PEO) per Program Action Directive (PAD) 16-01. The PEO has been charged with oversight of the acquisition and sustainment life cycle for NC3 and gives leverage across all things nuclear within the Air Force. As mentioned previously, this is beneficial for centralizing the priorities for one service, although it weakens the nuclear enterprise's capability at large.

Beneficial to NC3 being a weapon system and being aligned under USSTRATCOM, for example, one would find collaborative prioritization for resourcing and manning more balanced and less competitive. Additionally, training would be more standardized; operators and commanders would be less bound by cross-service/organization coordination; and decision makers would be more aligned with the commander's intent considering removed levels of bureaucracy. The AOC struggled to maintain a pool of equally-trained professionals. Augmented and other supporting personnel were managed by other Air Force specialty codes (AFSCs) and not given the training and experience as given to others. Much of the technology was state of the art, but the efficiency and capability provided by the AOC was limited due to operators being unfamiliar with the systems. Lastly, being unattached and removed from like professionals became demoralizing to many who were full-time and assigned to the weapon system. Their purpose was unclear and their value wasn't elevated.

In addition to maintaining and training NC3 professionals, there is a nonhuman element interwoven with those who operate it: the hardware and software elements of NC3. Colonel Goodwin argues the current NC3 infrastructure has proven unequal to emerging threats and challenges. She wants to see system modernization and evolution of NC3 become a "cohesive set of systems that will be cross-cutting, redundant, survivable and reliable." But she cautions the reader: "This is not an argument in favor of reducing the number of back-up components... or a 'top to bottom' replacement of equipment; this requires diverse and redundant processes, designed separately, to prevent any common mode failures or singular threat vectors from potentially degrading its effectiveness."<sup>14</sup> As she emphasizes the atrophy of the nuclear enterprise, Colonel Goodwin references more than the tangible components of NC3, but also the mindset and 70 years of unchallenged philosophies that go along with the lingering Cold War adage. Though the mindsets and hearts of all nuclear professionals are critical, the stage must be set to allow a foregone culture to change.

For the past two decades, the systems and networks that make up NC3 have been given the lowest of prioritizations. Owned and operated separately by the Air Force and Navy, NC3 has taken a back seat to other conventional capabilities in the current counterinsurgency (COIN) fight against Violent Extremist Organizations (VEOs). Since the end of the Cold War in the 1980s and the collapse of the Berlin Wall, many couldn't see another Hiroshima or Nagasaki. Likewise, budgetary focus areas and Congress support fell short of maintaining the nuclear enterprise; and when it didn't, only the weapon systems serving the nuclear triad received upgrades, not NC3. During his Prague speech in 2009, President Obama expressed "America's commitment to seek the peace and security of world without nuclear weapons," though he said, "As long as [nuclear] weapons exist, the United States would maintain a safe, secure and effective arsenal to deter any adversary and guarantee that same defense to its allies..."<sup>15</sup> Even today, President Trump has stated that the United States must expand and strengthen its nuclear capability.<sup>16</sup> Though without proper organizational oversight and structural integrity to NC3 as a weapon system, the safety, security and reliability of information and command authority granted via NC3 will be diminished and never brought forward to its full potential.

Lastly, a technologically advanced and ready NC3 weapon system is critical to U.S. National Security. Having a fail-safe nuclear mission is key in preventing a catastrophic event, or worse, a failed state. In Peter Feaver's book, *Guarding the Guardians*, he presents the always/never problem: The idea in which nuclear weapons always produce a nuclear yield when an authorized individual directs them to and never when they have not been directed to so. A reliable weapon, delivery system and communications network capable of delivering such authorization is the essence of positive control. Should either of these components or individuals fail to fulfill their purpose, a "less effective nuclear strike" or "complete paralysis of the nuclear organization" could occur. The never – or negative control – problem is considerably more complex. More challenges and

unknowns exist, complicating the safety and security of the arsenal at large. Too many safety measures complicate positive control in that it creates barriers, extra steps and more variables when trying to execute nuclear weapons. Feaver gives three never categories: accidental, unauthorized or third-party use. Considering that a nuclear weapon is never meant to be used in any other manner than its intended authorized state, each of these three categories are cause for very serious concern.

An accidental use occurs when a mechanical malfunction or glitch renders a weapon useless or unsafe. It also may be a result of a failed safety procedure from an individual operating on, in, or around a nuclear weapon, or a system that operates a nuclear weapon. Regardless of the situation, no ill intent was meant; it was accidental. Unauthorized use occurs when personnel use a nuclear weapon when not granted the authority to do so, per the President or his/her successor. While an unauthorized use may later be validated for reasons beyond the control of handling authority, it is still considered unauthorized by law. Lastly, Feaver mentions third-party use. While a nuclear weapon under US control has never been wrongly used or stolen by a third-party user, it is important to consider and maintain a strong defense.

In maintaining a safe defense or in practicing positive safety measures, a sound NC3 weapon system is critical. While NC3 isn't the perpetrator or the failed functionality, it can serve as an enabler or be in a position to intervene when looking to balance between the always and never problem.

#### Conclusion

From Plato to NATO, the history of command in war consists essentially of an endless quest for certainty – certainty about the state and intentions of the enemy's forces; certainty about the manifold factors that together constitute the environment in which the war is fought, from the weather and the terrain to radioactivity and the presence of chemical warfare agents; and, last but definitely not least, certainty about the state, intentions, and activities of one's own forces.

- Martin Van Creveld / Command in War

As world powers begin to test uncharted waters and old foes re-emerge to play a game of chess, one can't help but ask, Are we ready? The United States hasn't seen a world war in more than 70 years. Many would consider it a coincidence; others believe it to be by chance; the men and women standing watch over U.S. alert ICBMs, bombers and subs say otherwise.

To continue as a nuclear world power, change must happen. Since 2013, the nuclear enterprise has seen a positive shift in their favor. Revitalizing existing

infrastructure and replacing past life capabilities, the U.S. nuclear enterprise is reclaiming their deterrence, although the weapon and deliver systems are only half of the equation. To lose a weapon, or even a leg of the triad, the mission becomes crippled. To lose NC3, the U.S. nuclear arsenal becomes a stalemate.

In recognizing NC3 as a DoD weapon system and placing its control under the authority of USSTRATCOM, many benefits emerge. First, multi-service and multi-agency efforts fall under one authority: training, resourcing, sustainment, commander's intent, manning, policies, expectations, etc. are no longer competitive, no longer a lower priority. Second, NC3 gets the street credit it deserves. The professionals who own, operate and maintain the NC3 system are only recognized when a call fails to go through or when a message is not received. By making NC3 a weapon system, operators become true professionals, they are identified as qualifiers on the NC3 weapon system. They are given purpose; they are given value. Third, and last, NC3 is given new life. As the nuclear enterprise has atrophied for decades, so should NC3 be given an equal shake in upgrades and versatility. As the United States looks into the 21st century, one must consider how war looks over the horizon. Giving NC3 the stage to integrate across domains, to incorporate big data and to use breakthrough technologies, the nuclear enterprise could very well lead the U.S. armed forces into its next concept of C2.

### **NOTES:**

<sup>6</sup> Martin Van Creveld. Command in War (Cambridge, MA: Harvard Univ Press, 1985).

<sup>7</sup> Moshe Schwartz, "Defense Acquisitions: How DoD Acquires Weapon Systems and Recent Efforts to Reform the Process." *Congressional Research Service*, Washington D.C., May 23, 2014

<sup>8</sup> Ibid.

<sup>11</sup> Lt Col Jeffrey Hukill, "Air Force Command and Control – The Need for Increased Adaptability," Air Force Research Institute Papers (Maxwell AFB, AL: Air University, 2012).

<sup>12</sup> Major John O Hagen, Jr., "Manning & Training Issues for the AOC as a Weapon System" (Maxwell AFB, AL: Air University, May 2003).

<sup>&</sup>lt;sup>1</sup> General David L. Goldfein, "Non-Proliferation and Strategic Deterrence: Assessing the Role of the Triad in U.S. National Defense." 2016 Reagan National Defense Forum. Accessed on December 5, 2016.

<sup>&</sup>lt;sup>2</sup> U.S. Air Force, Program Action Directive16-01, August 2, 2016

<sup>&</sup>lt;sup>3</sup> Operational Navy Instruction (OPNAVINST) 5420.116, December 15, 2015

<sup>&</sup>lt;sup>4</sup> Program Action Directive 16-01.

<sup>&</sup>lt;sup>5</sup> Rachel Oswald, "Congress Wants Pentagon to Upgrade Nuclear Command and Control," *Defense One*, December 18, 2013

<sup>&</sup>lt;sup>9</sup> Ibid.

<sup>&</sup>lt;sup>10</sup> House. United States Code, 2006 Edition, Supplement 5, Title 10 – Armed Forces.

<sup>13</sup> Ibid., p. 23

<sup>14</sup> Colonel Kristin Goodwin, "NC3: Strengthening a Neglected, but Critical, Component of the U.S. Deterrent" (Maxwell AFB, AL: Air University, April 2013).

<sup>15</sup> Barack H. Obama, *The President in Prague*, White House, April 7, 2009.

<sup>16</sup> Carol Morello, "Trump Says He Wants to 'Greatly Strengthen and Expand' U.S. Nuclear

Capability," Washington Post, December 22, 2016.

### CHAPTER 6

## **Intercontinental Ballistic Missile Modernization**

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The United States must modernize its Intercontinental Ballistic Missile (ICBM) force in order for the triad to maintain credibility in the future operating environment. The United States Department of Defense (DoD) and Air Force have been avoiding the very daunting decision for years: to modernize or to not modernize its current Minuteman III ICBM weapon system. The decision is plagued with many arguments that have supported avoiding the investment in this crucial weapon system. The arguments range from the idea that land-based nuclear weapons are not needed at all, to the notion that the cost is too high for the government to bear. With so many points of view to help justify dodging the effort and cost of modernize. Main points for debate include the need for the land- based leg of the nuclear triad, the outdated technology, the cost of the weapon system, and the capabilities it provides.

Each of these topics can be used to argue for or against modernization. This research effort will not only analyze whether the United States Government should modernize its ICBM weapon system, but will evaluate the different options of modernization. Options include simply providing Service Life Extension Programs (SLEP), a low-cost, low-risk modernization effort, being worked currently through the Ground-Based Strategic Deterrent (GBSD) Program, to full modernization inserting new advanced technologies and capabilities into the critical weapon system that deters our adversaries every day. Although the stakes may appear high, modernizing this crucial weapon system cannot be delayed any longer. In order for our nation to maintain credibility and secure the safety of its people, the ICBM weapon system must be modernized to the extent of providing the utmost deterrent value in a world where the threat of nuclear war is rising.

The United States must modernize its ICBM Force in order for the triad to maintain credibility in the future operating environment. Even during a defense budget crisis, deciding whether to simply update the weapon system or completely modernize is not a decision that should be made solely on cost. There is no cost to effective deterrence; therefore, the decisions regarding our future ICBM weapon system cannot be made lightly and all factors must be considered.

### **Findings and Analysis**

### ICBMs: A Key Leg of the Nuclear Triad

Intercontinental Ballistic Missiles (ICBMs) provide a highly stabilizing strategic deterrent. They are on alert and ready to respond at all times; in fact, they provide the timeliest response of all assets within the nuclear triad. The nuclear enterprise cannot provide complete deterrence without this critical weapon system. Of the three legs of the United States nuclear triad, the ICBM force delivers the most value. It is the least expensive and protects against technological problems that may emerge in the other legs of the triad.<sup>1</sup> ICBMs protect the homeland. Through advantageously disbursed basing and hardened underground silos, they provide a vital insurance policy to the other legs of the triad unlike any other weapon system. The 450 active silos spread across Montana, Wyoming, and North Dakota are invulnerable to all but massive nuclear missile attacks. This dispersed placement makes targeting difficult and manages vertical escalation. The ICBM force cannot be wiped out by an adversaries conventional forces, and even nuclear forces would be required to strategically strike many locations in a short timeframe prior to American response in order to take down the force. Each underground missile would have to be hit with more than one nuclear weapon in order to penetrate a missile. Thus, their existence sets a high threshold for attacking the United States, either conventionally or with nuclear weapons. Without ICBMs, our strategic nuclear targets shrink from 504 to five, two submarine launched ballistic missile (SLBM) bases and three bomber bases, all of which could be destroyed with conventional strikes.

The currently fielded ICBM weapon system is the Minuteman III ballistic missile. The missile was deployed in 1970 and placed within existing mid-1960's silos and infrastructure. The Minuteman III weapon system was designed for a service life of only 10 years, yet now has been sustained and on alert for almost 50 years. The entire missile is currently made up of all the original technology and parts as when it was built in the 1960s with the exception of the solid propellant within the three stages of motors, which has been washed out and re-poured. The majority of all supporting technology within the launch facilities, to include command and control communication tools, are still original.

Entering a silo or launch facility today is like stepping back in time. Sustaining such a weapon system has great challenges. The components within the missile cannot simply be replaced. The majority of parts are specialty items, down to the tools required to work on the missile, all of which are no longer being produced regularly in industry. Many of the materials necessary to even build the components are not available in today's market. Obsolete computer chips and boards, floppy disks, 1970s computers and software, vacuum tubes, and hardened inter-site cable systems (HICS) are just a few items that are not available; yet, are crucial components to this active weapon system. The efforts and cost associated with simply keeping each missile and facility on alert are high. Adding to the problem, each year the Air Force conducts on average three Glory Trips in order to test the current system, literally launching missiles into the ocean to never be retrieved. Not only is it difficult to keep the alert missiles active with old parts, but the number of weapons and parts are diminishing with every Glory Trip. It actually costs more to update, replenish, and sustain the missiles with outdated parts than completely replace the weapon, information supported within the Ground-Based Strategic Deterrence (GBSD) Analysis of Alternatives.

### Nuclear Deterrence Theory and ICBMs

Nuclear deterrence is a combination of capability and will. It seeks to maintain the status quo by discouraging an opponent from changing its behavior. Effective deterrence is a function of real capabilities and the perception by potential adversaries of a credible national will to respond to aggression. Adversaries and potential adversaries must believe the United States will take action before its nuclear arsenal is destroyed or by making sure it has a second-strike capability.<sup>2</sup> Many theories support deterrence; yet, many of the theories approach how to deter differently. Overall, deterrence is necessary. Without nuclear deterrence, the nation lacks power in the international community, is vulnerable to adversaries, and cannot protect its people and the homeland.

The nation's nuclear weapons are used for deterrence every day. Adversaries are acutely aware the United States is a nuclear power and this profoundly influences their decision making. Within the international order, all states desire power. The ownership of nuclear weapons is viewed as the supreme form of power because of their unmatched ability to destroy all life on earth. The enormous destructive power of nuclear weapons is almost beyond comprehension.<sup>3</sup> A state that holds nuclear weapons has the power to deter and coerce other states into doing what they desire. The problem is, all states are not motivated by the same thing. A state's motivation to acquire nuclear weapons often revolves around deterrence, defense, intimidation, prestige, and a last resort weapon. Each of these motivations reflect the desire for power. All states who wish to obtain or hold nuclear power may not be motivated by each item listed. For example, the United States focuses on the value of deterrence, defense and a last resort weapon when it comes to its nuclear capabilities. On the other hand, Russia, in recent years, seems to indicate that they value the intimidation and prestige of being a nuclear power. Russia is actively flexing its nuclear muscles and sees nuclear weapons as a normal extension of a conventional conflict. According to a recent in-depth analysis completed by "60 Minutes," it is believed that to Russia, use of nuclear weapons is not unthinkable. In Russia's military doctrine, signed by Russia's president Vladimir Putin in 2014, it states that Russia shall reserve the right to use nuclear weapons, in the event of aggression, when the very existence of the state is in jeopardy. Russia's nuclear exercises have increased in size and frequency in recent years and there have been specific doctrinal and public statements made by Russian leaders that indicate an evolved willingness to employ nuclear weapons in the course of conflict. Also, Russia is interested in how nuclear weapons could be used in conflict to either close a gap or sustain the opportunity for victory.<sup>4</sup>

Russia is just one example of the need to maintain a credible arsenal. Many rising powers in the international community are acquiring and building their nuclear arsenals. The increase in weapons and increase in capabilities among potential adversaries only increases threat. The nation must not only work to maintain its status of power, but also strengthen its nuclear capabilities in ways that will increase deterrence value and be prepared in the event of nuclear war.

Nuclear weapons have two uses: deterrence and war fighting in the event that deterrence fails. Even with all the nuclear theories on why and how deterrence works, all theorists are quick to also say "deterrence can fail."<sup>5</sup> Deterrence depends on a subjective feeling which we are trying to create in the opponent's mind, a feeling compounded by respect and fear.<sup>6</sup> As other states grow their nuclear capabilities, their level of fear will decrease. Russia and China are currently implementing technologies into their weapons that far exceed ours. What happens when we are no longer capable in the eyes of our adversaries? Does public news articles reviewing the aged and neglected status of our nuclear assets provide enough to them to view the United States as lacking capability? Deterrence must be the perfect combination of capability and will, and our capabilities are aging and diminishing by the day.

President Obama envisioned a world without nuclear weapons, stating within his 2009 Prague Speech that the United States will "seek the peace and security of a world without nuclear weapons." He also acknowledged that as long as nuclear weapons exist, the United States will maintain a safe, secure, and effective arsenal.<sup>7</sup> Although there have been many efforts to downsize our nuclear arsenal, now is not the time to eliminate a key leg of our triad. The employment and structure of the nuclear triad affects our credibility and the benefits of the ICBM strengthen, not only the triad, but our credibility and deterrence value.

ICBMs are the most safe, secure, and effective leg of the triad and are the most economical -- safe and secure due to their dispersed nuclear hardened underground silos, protected from conventional attack, and most effective by providing an always-on-alert weapon system with the fastest response time of all nuclear weapons. According to the nuclear theorist and strategist who established the basics of nuclear strategy, Bernard Brodie, land-based missiles are a more reliable weapon choice. As stated by Brodie, "The main value of ballistic missiles over aircraft to the attacker is precisely their high probability of successful penetration per unit, at least under present techniques of defense."<sup>8</sup> Missiles also provide the fastest response time, according to nuclear theorist Thomas Schelling, an early United States nuclear strategist. Schelling argued that ICBMs have the fastest response time and are capable of holding whole societies at risk. As part of his counter value and minimum deterrence theories which are reflected in the current nuclear posture of the nation, ICBMs are required in order to constantly hold an opponent's assets which are of value, such as cities and civilian population, at risk.<sup>9</sup> The slow response time of bombers and submarines cannot achieve the appropriate level of deterrence at a low number of assets to the extent of the always-on-alert and on-target ICBM force. ICBMs provide the most responsive counter value strategy while supporting minimum deterrence, which is holding the least amount of nuclear weapons yet achieving the same effects as an unlimited number.

ICBMs cost less than any other leg of the triad and provide the greatest deterrence value. According to Brodie, land-based missiles are also the most economical of the nuclear weapon options.<sup>10</sup> He compares the price versus the deterrence value and determines that, of all nuclear weapon choices, ICBMs are the most economical choice. Although this claim was made years ago, it is reflected in the current dollar figures for sustaining the different legs of the nuclear triad. A GAO report estimating sustainment and modernization costs of the nuclear enterprise from 2016-2025 illustrated that bombers will cost \$73.5 billion, submarine-launched ballistic missile systems will cost \$79.6 billion, and ICBMs will cost \$22.5 billion. These dollar figures include all modernization costs for each leg over the 10-year period, which includes GBSD modernization efforts.<sup>11</sup>

Although ICBMs are the most economical choice within our nuclear arsenal, all weapons come at a cost. As for the cost to originally acquire a weapon system, the same is true for maintaining, updating, and modernizing weapons. Brodie stated, "We do not have and probably never will have enough money to buy all the things we could effectively use for our defense. The choices we have to make would be difficult and painful even if our military budget were twice what it is today. The fact that we are dealing with a lesser sum only makes the choices harder and more painful."<sup>12</sup> Of course, the American people as a whole are concerned solely about the cost of modernizing the ICBM weapon system, and any other government-owned weapon system. Money and cost is always in the forefront of decision-making, especially in a time when there are constant reminders of the current defense budget crisis. The nation as a whole is interested in money and its place in national security policy. Even Brodie said, "We want to know how it is provided and how it is spent for military purposes. We want to have some feeling for what kind of actions and preparations are feasible and what Stark

kinds are wholly out of the question. We also want to have some inkling of what is involved in choosing among weapons systems."<sup>13</sup> The American people should know how our DoD funds are being spent, but they must also know the benefits provided by each weapon system. Unfortunately, when it comes to choosing to modernize our aging ICBM weapon system, there are two very opposing sides of the nuclear debate, to fund or not to fund.<sup>14</sup> There are also very loud supporters of disarmament and a lack of cries for modernization.<sup>15</sup> This can be linked to the focus on the money being spent rather than the benefits provided by the money spent.

Decisions made prior to the need to use a weapon system during war are just as critical as the decision to use them in conflict. "Strategy in peacetime is expressed largely in choices among weapons systems, which, of course, are not bought ready-made off the shelf but developed selectively by a process which itself involves heavy costs and many pitfalls."<sup>16</sup> Such is the case of the current ICBM modernization effort, the GBSD program. Peacetime provides great opportunity to focus on our important weapon systems and ensure that they are ready for wartime. However, it is important to remember that weapon systems that provide deterrence are not only used during war, they are used each and every day in deterring our adversaries. This makes their ability to be ready and on alert and in the utmost functioning condition even more important.

Thinking through options and making decisions may sound simple, but often it is far from artless. Time must be spent wisely, and care must be used in order to not repeat the mistakes made when first developing the ICBM weapon systems. As adversaries are modernizing and building their nuclear weapon systems, we cannot afford to continue to debate and avoid progress. During the time of the original ICBM weapon system being developed, years were wasted with debating and avoiding, leading to a "missile gap." The Soviet Union had the ability to launch into space prior to the United States, raising questions regarding the United States position of power and safety. Years were spent avoiding the cost and the need which ultimately put our nation at risk. Edmund Beard's research regarding the development of the ICBM ultimately characterized the decisions of the time as neglect and indifference. Through examining government records, he found that the ICBM could have been developed considerably earlier. The decisions and ideas of the time can be directly correlated to the current discussions and road blocks regarding modernization of the current ICBM weapon system. Delays due to budget cuts, resistance to new ideas, and lengthy bureaucratic decision-making all led to the missile gap. Also, questions such as, "Is the weapon system necessary and can the United States afford the weapon system?" caused delays. The military is taught to be risk-adverse, which adds to the natural tendency to preserve what is familiar in a desire to avoid risk. "Beard states, the normal practice of risk aversion is necessarily heightened by the nature of the military, which requires secure procedures and equipment. Naturally, the military relies on tested, well understood weapons."<sup>17</sup> This not only hinders acquiring new or updated assets, but ultimately leads to a military that is not technologically advanced or has superior capabilities.

Modernization has already been delayed for too long. Bureaucratic politics, questions regarding the value of deterrence, and the role it plays cannot continue to delay decisions. A choice must be made that is not hindered by questions that have already been answered in the past. Nuclear deterrence is necessary. The United States must do what is necessary to provide the appropriate combination of capability and will in order to deter adversaries, maintain power, and protect the homeland. Risks must be taken; otherwise, the United States will be at risk.

### Modernization Must Happen

Is our nation willing to make the ultimate wager against nuclear deterrence? The choice to modernize or not is a decision our nation has to make and it must be made now. Our ICBMs are in dire need of modernization. We, as a nation, must make a choice, to modernize or not to modernize. The choice cannot be made lightly; yet, we may never know if we made the right decision. It is the classic Pascal's Wager, in that humans all bet with their lives either that God exists or that he does not. It's better to bet on God's existence than against it. If he exists, you'll be an eternal winner; if not, you've lost nothing.<sup>18</sup> Just as Pascal offers a pragmatic reason for believing in God: even under the assumption that God's existence is unlikely, such is the decision to maintain our nuclear deterrent although a nuclear attack may seem unlikely to some. The choice is to spend billions and potentially it never mattered, or we don't and the United States loses military, strategic, and political advantage, or worse yet, total annihilation. Cost is not the issue at hand. Either the nation modernizes the ICBM force and remains a strong nuclear power or allows the weapons system to become worthless and risk nuclear attack. We are betting our lives. Can we afford to be wrong?

The United States must make the decision now to modernize its nuclear arsenal or ultimately choose to move toward full diplomacy and disarmament. The decision has been delayed for years, and we cannot afford to delay any longer. A credible and effective nuclear deterrent has been a foundational component of our national security for more than 60 years. However, as mentioned, our current Minuteman III system is nearly that old. This crucial weapon system is outdated and in need of updating and advanced technology. As the Minuteman III system ages, our nation becomes more and more vulnerable to attack and our influence in the world is decreasing. Our nuclear arsenal is the number one form of communicating the power of the United States to the rest of the world. Without a capable and reliable weapon system, the United States is just another country in the international community. Simply sustaining the current system is not an option as it decreases our credibility in the eyes of our adversaries, jeopardizes our power and influence within the international order and weakens our deterrence value. Russia, China, North Korea, Iran and Pakistan are keenly aware of our nuclear capabilities as they build and modernize their own nuclear forces. Our current weapon system may be deterring for now, but our adversaries know our capabilities are aging and becoming less reliable. Modernizing retains important strategic advantage while other countries move forward with their nuclear efforts.

Cost cannot be the independent variable and must not be the deciding factor. Focus needs to be on maintaining nuclear capabilities necessary to credibly deter attacks from established nuclear powers and to provide an effective counterforce against hostile emerging nuclear states in dangerous situations. Currently, it may appear cheaper to simply sustain the weapon system and continue to wait to modernize, but in the long run the cost is much higher as components become more difficult to maintain and replace due to age. As the current system ages further, it will become more and more expensive to provide Service Life Extension Programs (SLEPs), and the ability to modernize, rather than completely replace becomes smaller. As our economy becomes weaker and budget restraints become higher, we cannot afford to risk the potential inability to afford the weapon system later on. Looking at the overall defense budget, the cost of modernizing our crucial ICBM weapon system is simply a sliver; it is a small price to pay for protecting our homeland and maintaining a powerful status internationally.

It is the ultimate gamble. Truly a live or die decision. Modernize the weapons system and nothing happens, our lives remain the same, or do not modernize, leaving ourselves undefended in an increasingly nuclear world. The back end is hell. To not modernize means lack of a credible deterrent and become hostage to nuclear powers such as Russia and China and live in fear of nuclear attack and annihilation. But, to modernize, we live to breathe another day. Will we as a nation be eternal winners, or lose everything?

### Ground Based Strategic Deterrent

Currently, the Ground Based Strategic Deterrent (GBSD) program is in the works to modernize the Minuteman III weapon system. This is a \$62 billion dollar effort to replace the missile, along with update the supporting infrastructure and command and control system. The dollar amount, although seemingly large, is to be spent from 2017 through 2075. This includes research and development and design efforts, along with testing and fielding. Over the timeframe, the dollar amount is rather small in comparison to the total defense budget. Providing great benefits to the weapon system, GBSD will be a new missile with better range and accuracy, will provide better command and control structure, will reduce the

logistics footprint by providing health status of each missile and provide fixes without penetrating the sites, enhances security features with better threat detection, and the government will own the technical baseline. This effort is focused on being low-cost, low-risk, and although it incorporates many updated technologies in comparison to the current 1970s model, it does not consider advanced technologies, such as the ones many adversaries are placing within their weapon systems.

Currently, the GBSD program is in the earliest phase of the acquisition process. The Technical Maturation Risk Reduction (TMRR) effort, or research and design phase, has been solicited, and received proposals from three large defense contractors, with intentions to award to two contractors. The intent of GBSD TMRR is to develop a replacement to the Minuteman III ICBM weapon system. As per the GBSD TMRR Statement of Work, this phase will develop a complete weapon system preliminary design and create plans necessary for a Milestone B decision to enter the Engineering and Manufacturing Development (EMD) acquisition phase. EMD phase typically builds and tests the designed weapon system for approval prior to entering production.

Even with the GBSD program in the works, the United States has not fully committed to the modernization effort and the money to complete the program is currently on the chopping block. Because of the constant debate as to whether or not the modernization is necessary, the program has fought an uphill battle just to get to this phase, to the point that the Request for Proposal was directly reviewed by the President of the United States prior to the release, something that almost never happens. In the end, the United States must come to a clear decision and communicate it strongly, ending the constant debate.

GBSD is not officially a program of record, and will not achieve such status until reaching Milestone B of the acquisition cycle. This will occur at the completion of TMRR, prior to beginning EMD. However, the DoD has, in a sense, deemed GBSD to be feasible, acceptable, and adequate, at least to the point of approving Milestone A and approving the release of the TMRR RFP. GBSD is a feasible option, as proven through years of research within the government and with industry, determining that building a new ICBM can be done. The technologies and capabilities are available and have shown to be possible within the estimated dollar amount. In fact, three contractors, Boeing, Lockheed Martin, and Northrop Grumman have determined themselves capable and submitted proposals to complete the TMRR with the intent of participating throughout the life of GBSD.

Then why is there still a possibility of DoD cutting the GBSD program? The answer may simply be in the messaging. GBSD's bill of \$62 billion spread from 2017 through 2075 averages out to \$1.05 billion per year.<sup>19</sup> This is a small amount of the overall yearly defense budget and lower than the amount of yearly sustainment costs of the Minuteman III. In a DoD budget estimate report for

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sustaining and modernizing nuclear delivery systems, the projected Minuteman III sustainment costs from 2016-2020 averaged out to \$1.56 billion per year.<sup>20</sup> When taxpayers hear \$62 billion dollars, they do not hear the details, only the mass amount of money. The reality is that it's a comparable price to what is being spent on sustainment without updates to the system or the technology. That money can be spent replacing floppy disks and old computer systems being specially manufactured to mirror the 1970s technology since no other customer is purchasing such out dated items, or the money can be spent on obtaining new technology, updated assets and capabilities, and overall increasing deterrence value.

The overarching problem with GBSD is that \$62 billion dollars will be spent and only updates will be made. As a low-cost, low-risk program, new advanced technologies will not be considered. Ultimately, this is a Minuteman IV effort, simply bringing the current weapon system to a functioning status and to technologies that are more effectively acquired and used in the current day. The system will be modular, which will allow the insertion of new technologies more easily than the current system. However, there are no advanced technologies and changes will be kept at a minimum in order to achieve the lowest cost possible.

### Other Options for Modernization vs. GBSD

Since GBSD is early in the acquisition process there is opportunity for change. There is also opportunity for cancellation, as reflected in the current debate and risk of the budget being cut. The United States could choose not to update or modernize the current ICBM weapon system, ultimately allowing the system to age out. Continuing to provide Service Life Extension Programs (SLEP) is also an option. Or, the United States can make the choice now to truly modernize the weapon system, providing the upmost deterrent value and credibility to the nuclear enterprise.

Doing nothing is an option on the list of choices; however, the choice must be accompanied with disarmament. Allowing the system to age out clearly does not provide an adequate system and eliminates the land leg of the triad and deterrent value. Without any updates the system will stop functioning. This would be a part of an overall decision to completely remove the nuclear arsenal from the United States. Although this may be a dream of some stakeholders, it is not realistic and likely not going to be seen any time in the near future. The amount of risk that would accompany the loss of this critical leg of the triad would not be acceptable, nor is it feasible to expect nuclear deterrence to be effective without these assets. The United States could not provide adequate safety to the homeland through this route.

Service Life Extension Programs are a form of providing updates and modernization. This is currently happening in order to simply keep the system functioning and on alert. This is sustainment of the weapon system and pieceparting the system as failures occur to the point that repairs and updates are required and prove to be the most cost-effective. This route is feasible, adequate and acceptable for now, but in the near future, it will be too costly to sustain our aging weapon system.

The last option, aside from moving forward with the current GBSD program, is full modernization. This would involve increasing capabilities and creating a new weapon system that can deter adversaries into the future. One must take into consideration not only the technologies of the systems belonging to adversaries, but also new developments and technologies being tested throughout industry that could increase our capabilities and the effectiveness of our weapon system. As with all advancements, they come at a cost, but the cost must be balanced with other considerations, not simply 'what is cheaper.' This is not to say cost should be unlimited, but pay the bill for a weapon system that will provide deterrence in a world where nuclear war is a rising threat. A new weapon system is necessary in order for the United States to remain the leading world nuclear power. It is adequate, acceptable, and feasible to do so and many industry partners have completed research and development proving newer technologies are available or possible within an acceptable timeframe. To make things even simpler, a fully modernized system could be achieved with small changes made to the current GBSD program. There is no need to start over from scratch; simply insert a level of risk into GBSD and allow the design to take into consideration new technologies and choices that are not limited to the lowest cost and the lowest risk. With great risk comes great reward.

When addressing the different options the United States is facing with the ICBM weapon system, the choice can be made from full disarmament to full modernization, making the greatest most capable and highly technologically advanced weapon. No matter the arguments from each side of the debate, the greatest concern is deterrence. Deterrence is the combination of capability and will; without capability, deterrence fails. Can our current weapon system continue to deter our adversaries who are modernizing their land-based ballistic forces? Are we doing enough with the new GBSD program to provide deterrence in the future? Does it provide nuclear stability? At what level does the capabilities of the weapon system provide the proper level of deterrence or simply make adversaries with much more capable nuclear weapons laugh? The questions may never be fully answered without finding our country in a position of failed deterrence, at which point, we have failed, making this a crucial and possibly dire decision.

### Conclusion

As our next president moves into office, it is important that all stakeholders are communicating the same strong message: we must modernize. The next Nuclear Posture Review (NPR) must communicate clearly to, not only stakeholders and the nation's citizens, but to our adversaries and allies that the United States will modernize and remain the world's nuclear hegemon now and throughout the future. Our nuclear credibility and capabilities are key in our survival.

In this day and age, a strong nuclear arsenal is a key factor in defining a hegemonic status within the world order. Rising powers are building their nuclear capabilities foreseeing the importance in power and security. The United States can no longer afford to neglect its nuclear enterprise, as it has done for decades. Now that the nuclear assets are receiving attention and are in the early phases of modernization efforts, cutting corners in order to save money would simply be wasting time and money. Modernization will come at a cost; however, cost cannot be the sole deciding factor when choosing to modernize or at what level to modernize. President Trump must make the U.S. Nuclear Posture Review a top priority and specify within the document the level of modernization the United States will pursue immediately in order to regain our nation's status as the leading world nuclear power. In order to achieve this, now and into the future, GBSD should be modified away from the current low-cost, low-risk solution which merely provides updates. In order for the ICBM weapon system to serve its purpose, the government needs to allow the design of the next ICBM weapon system to accept risk, including new technologies and capabilities that will provide the utmost deterrence value in the future.

### NOTES:

<sup>2</sup> Ibid.

<sup>3</sup> Joseph S. Nye Jr. and David A. Welch, *Understanding Global Conflict and Cooperation: An Introduction to Theory and History* (Boston, MA: Pearson, 2013), p. 172.

<sup>4</sup> CBS News 60 Minutes, *The New Cold War*, September 25, 2016.

<sup>5</sup> Bernard Brodie, *Strategy in the Missile Age* (Santa Monica, CA: RAND Corp, 2007), p. 393.

<sup>6</sup> Ibid., p. 397.

<sup>7</sup> Department of Defense, 2010 Nuclear Posture Review, p. i.

<sup>8</sup> Brodie, *Strategy in the Missile Age*, p. 202.

<sup>9</sup> Keith Payne, *The Great American Gamble: Deterrence Theory and Practice from the Cold War to the Twenty-First Century* (Fairfax, VA: National Institute Press, 2008).

<sup>10</sup> Ibid., p. 203.

<sup>&</sup>lt;sup>1</sup> Peter Huessy, "Why We Still Need Those Nuclear Missile Silos," *Breaking Defense*, April 14, 2016.

<sup>11</sup> Government Accountability Office. Nuclear Weapons Sustainment: Improvements Made to Budget Estimates Report, but Opportunities Remain to Further Enhance Transparency, p. 13.

<sup>12</sup> Brodie, Strategy in the Missile Age, pp. 359-60.

<sup>13</sup> Ibid., p. 362.

<sup>14</sup> Brad Roberts, *The Case for U.S. Nuclear Weapons in the 21st Century* (Stanford, CA: Stanford Univ Press, 2016), p. 44.

<sup>15</sup> Ibid., p. 46.

<sup>16</sup> Brodie, *Strategy in the Missile Age*, p. 361.

<sup>17</sup> Edmund Beard, *Developing the ICBM: A Study in Bureaucratic Politics* (New York: Columbia Univ Press, 1976), p. 238.

<sup>18</sup> Stanford Encyclopedia of Philosophy, "Pascal's Wager," May 2, 1998, rev November 2, 2012.

<sup>19</sup> Government Accountability Office. *Nuclear Weapons Sustainment: Improvements Made to Budget Estimates Report, but Opportunities Remain to Further Enhance Transparency,* p. 13.

<sup>20</sup> Ibid.

## **CHAPTER 7**

# Incredibly Big: The Case for Low Yield Nuclear Weapons

Shane Vetter, Lieutenant Colonel, United States Air Force

Thus far, the chief purpose of our military establishment has been to win wars. From now on, its chief purpose must be to avert them. – Bernard Brodie

The year is 2019. Russia is at war with Ukraine after annexing more territory. With substantial Western assistance, Ukraine is beginning to turn the tide against the Russian forces. Putin has threatened the use of tactical nuclear weapons if the Ukrainians don't concede to his terms. The United States counters that the use of nuclear weapons would constitute a "red line" that would draw America into the conflict. Russia does not consider the threat credible due to the relatively high yield of U.S. nuclear weapons, and uses a low yield tactical nuclear weapon to dislodge Ukrainian forces from a strategic stronghold. The President is asked by his Secretary of Defense if he would like to retaliate with nuclear weapons. American weapons have a much higher yield, and their use would be disproportionate. However, failure to respond would undermine American credibility, strategic deterrence, and especially the extended deterrence of our allies.

While the above scenario is fictitious, the strategic dilemma that the United States has created for itself is not. In the future, an American President may find him- or herself facing a situation where an opponent has used (or threatened to use) a low-yield nuclear weapon, and not have a similar low-yield weapon available to use as a deterrent or in response. The two unpalatable options are: 1) do not use a nuclear weapon in response, which could severely undermine credibility and extended deterrence; or 2) respond with a much higher yield weapon, which would likely be seen by the world community as indiscriminate and disproportionate. This dilemma severely reduces the credibility of U.S. nuclear deterrence, particularly with respect to the extended deterrence of its allies.

Russia is developing very low yield nuclear weapons that could be used in a tactical situation on the battlefield. In comparison, the yields on American nuclear weapons are significantly higher. Potential adversaries who contemplate using low

yield tactical nuclear weapons are unlikely to be deterred by the United States' nuclear arsenal, since the much higher yield would produce a grossly disproportionate and indiscriminate effect. In order to have a credible deterrent for these weapons, the United States needs to develop a low yield nuclear warhead. Furthermore, with a low yield penetrating nuclear weapon, the United States would be able to hold additional targets at risk, denying sanctuary from adversaries who construct hardened, deeply buried command centers and other facilities.

This thesis will be supported by an analytical application of nuclear deterrence theory. First, the paper will review some foundational concepts of nuclear deterrence developed by Brodie, Schelling, Kahn and Narang. Next, it will describe the threat posed by Russia's evolving nuclear posture, along with the emergence of hardened deeply buried targets throughout the world, and describe why the United States needs to adjust its posture to maintain a credible deterrent. After that, the paper will consider the alternative viewpoint that the existing U.S. nuclear arsenal, including current modernization programs, provides a sufficient deterrent to Russia and other nations. Finally, the paper will conclude with recommendations for further study and analysis.

### **Findings and Analysis**

So long as there is a finite chance of war, we have to be interested in outcomes; and although all outcomes would be bad, some would be very much worse than others.

- Bernard Brodie<sup>1</sup>

Nuclear Deterrence Theory

Bernard Brodie was the first prominent political scientist to delve into the dilemma created by the advent of nuclear weapons with his essay, "The Absolute Weapon: Atomic Power and World Order," published in 1946 within months of the world's first atomic bombing,<sup>2</sup> and his seminal work, *Strategy in the Missile Age*, expanded on his ideas. As a researcher employed by the RAND think tank, he developed many of the fundamental principles of nuclear deterrence.

Brodie identified credibility as one of the key problems facing nuclear strategists. While it is relatively easy for the United States to convince would-be adversaries that it will attempt to respond to a nuclear attack on the United States, credibility becomes much more difficult in the case of extended deterrence, or in the *massive retaliation* strategy that had been used by the Eisenhower administration. In massive retaliation, the United States was prepared to respond to any territorial attack against Europe by the Soviet Union by initiating a full-scale nuclear war.<sup>3</sup> The policy was clearly intended to maximize the use of America's nuclear deterrent, but the overwhelming response it purported may have caused questions within the USSR as to whether or not Eisenhower would actually follow through with the threat.<sup>4</sup>
Brodie also developed the concept of marginal deterrence. He postulated that even a powerful country might be deterred by a weak country, as long as the weak country had the guaranteed capacity to deliver a single nuclear weapon against the strong country. While 10 nuclear weapons would have a greater deterrent value than one, and 100 weapons would have a greater value than 10, it stands to reason that each additional weapon would result in an incrementally smaller gain in deterrent effect than the previous one. This led to the concept of a "minimum deterrent," which is the minimum number of weapons needed to deter an adversary, and the "maximum deterrent," which is the number of weapons that will "utterly defeat" the adversary. Brodie qualified the concept of a minimal deterrent with the considerations paraphrased here: (1) it requires a large enough force to guarantee that some weapons will get through, (2) the effectiveness of the deterrent is relative to the adversary's motivation to win, (3) the United States needs enough weapons to fight a nuclear war if deterrence fails, and (4) the retaliatory force must also be capable of striking first, so it must be stronger than the adversary's retaliatory force. He also noted the important psychological consideration that a large force simply looks more impressive than a small one.<sup>5</sup>

Finally, Brodie emphasized the need to have a survivable second strike capability. If an adversary believes that it can successfully annihilate its opponents' nuclear weapons in a preemptive strike, it will be highly motivated to do so. However, if a sufficient number of nuclear weapons are able to survive that preemptive attack and retaliate, the adversary is likely to be deterred from attempting the preemptive strike. He expanded this principle to describe the concept of strategic stability, wherein both sides have an assured second strike capability, resulting in stable deterrence for both antagonists.<sup>6</sup>

Thomas Schelling was arguably the most influential political scientist to write extensively about the theory of nuclear deterrence in the United States. He described the concepts of brute force and coercion, and how nuclear weapons are the ultimate weapon for coercion due to their ability to inflict a massive amount of pain on the victim state. He adds the important nuance that not only must a coercing state threaten severe punishment if its demands are not met; it must also promise a reward (which may simply be the absence of punishment) if its demands are met. The coercive power is most effective when it is threatened — Schelling uses the term "latent violence" to describe the effect.<sup>7</sup> Once pain has been inflicted, the power to coerce has been expended and lost unless the coercer has additional weapons in reserve to threaten more damage in the future.

One of the key ways that nuclear weapons have changed the art of war is that they are unique in their ability to *quickly* kill large numbers of people, in comparison to the much slower process of killing them with conventional or improvised weapons.<sup>8</sup> This property gives an overwhelming dominance to the offensive over defensive tactics, since a full-scale nuclear war would likely be over before military defenses could be mobilized or concentrated, even if they were already on alert. In addition, Schelling defines the distinction between deterrence and compellence.<sup>9</sup> Deterrence prevents an adversary from doing something that they would otherwise want to do; compellence forces an adversary to take an action that they otherwise would not want to take. Schelling also described counterforce and countervalue targeting. In counterforce targeting, a nation strikes at its opponent's military with a particular emphasis on nuclear capabilities, thereby limiting the opponent's ability to inflict damage in a counterstrike. Schelling doesn't use the term "countervalue" directly, but he contrasts counterforce targeting with the strategy of targeting an opponents' cities. Counterforce targeting tends to be destabilizing, since it gives both sides (the attacker, and the defender who would lose a significant portion of its retaliatory arsenal) a massive incentive to strike first. However, striking directly at cities is contrary to morality, American values, and the law of war.<sup>10</sup>

Schelling's policy recommendation was to achieve a "balance of terror" with the Soviet Union. Under this strategy, both sides would deliberately avoid protecting their civilian populations from nuclear attack, either through passive (hardening or bunkers) or active (anti-ballistic missile or anti-aircraft) defenses. By keeping the population vulnerable, both sides would be mutually deterred from initiating a nuclear conflict, since their people would be annihilated in a retaliatory strike.<sup>11</sup> Schelling's recommendation was ultimately adopted by U.S. leadership through the duration of the Cold War, solidifying his place as the most influential American theorist on nuclear deterrence.

Herman Khan's ideas on deterrence focused on how to effectively "use" nuclear weapons to accomplish a nation's strategic objectives. (Rather than being employed in a kinetic exchange, nuclear weapons are continuously "used" as a strategic deterrent). Khan contends that deterrence is made more credible through the development of specific capabilities. He advocated constructing passive and active defenses for the U.S. homeland,<sup>12</sup> as well as fielding forward-deployed tactical nuclear weapons in Europe. He infamously stated that a nuclear war could be won. However, Keith Payne, a prominent U.S. nuclear policy maker, argues that Khan's goal was not to win a nuclear war by fighting one, but to make deterrence (especially extended deterrence) more credible by creating a force structure that makes it possible for the United States to defend its allies without being destroyed. <sup>13</sup> Khan attempts to answer the question "Will the United States trade New York for Paris?" by finding a way to defend the people of New York while simultaneously committing U.S. forces, including nuclear weapons, to the defense of Paris.<sup>14</sup>

Vipin Narang's research focuses on the nuclear postures of regional nuclear powers. Based on historical evidence, he asserts that the nuclear posture of a given country has a dramatic impact on the effectiveness of its deterrence. According to Narang, "Nuclear posture is the incorporation of some number and type of nuclear warheads and delivery vehicles into a state's overall military structure, the rules and procedures governing how those weapons are deployed, when and under what conditions they might be used, against what targets, and who has the authority to make those decisions."<sup>15</sup>

Narang identifies three types of postures that have been assumed by regional nuclear powers, and draws out a key insight when he compares their relative effectiveness. Many political scientists contend that the mere presence of nuclear weapons is sufficient to deter attack, and that a relatively small number of weapons will deter just as well as thousands of them, with virtually no emphasis placed on employment doctrine.<sup>16</sup> Based on historical observations, Narang finds that this is not the case. Instead, he finds that "states care more about what an adversary can credibly *do* with its nuclear weapons than what it *says* about them."<sup>17</sup>

A final foundational deterrence topic is that of extended deterrence, which is concisely described by Keith Payne. Throughout the Cold War, the United States committed itself to the defense of its NATO allies in Europe, threatening to respond to any Soviet territorial aggression with nuclear weapons. The strategy was known as Massive Retaliation under Eisenhower, which promised a full-scale nuclear war. The official U.S. policy softened with the Kennedy administration's Flexible Response, which allowed for the United States to respond with a broad array of responses. Extended deterrence is far more difficult than deterring attacks on the homeland. It is generally accepted as a given that a country will retaliate in self-defense, but it is much more difficult to establish that a nation will risk its own self-destruction on behalf of an ally in a distant corner of the world.<sup>18</sup> Reassuring allies is an even greater challenge, as they are the ones who will suffer the most from a failure of extended deterrence. As noted by British Defense Minister Denis Healey in the late 1960s, "It takes only five percent credibility of American retaliation to deter the Russians, but ninety-five percent credibility to reassure the Europeans."<sup>19</sup>

# Legal Ramifications

You have got to understand that it isn't a military weapon ... It is used to wipe out women and children and unarmed people, and not for military uses. So we have to treat this differently from rifles and cannon and ordinary things like that.

– President Harry S. Truman

Two key principles of Just War Theory are discrimination and proportionality. For a military action to be discriminate, it needs to target the opponent's military forces and supporting infrastructure, while minimizing civilian casualties and collateral damage. The employment of any of the existing nuclear weapons in the U.S. arsenal would almost certainly inflict a considerable amount of collateral damage, which could be mitigated with the development of a lower yield warhead.

The principle of proportionality dictates that the amount of force used must be justified by the political ends being sought, and that furthermore one "should not retaliate with overwhelming force."<sup>20</sup> The retaliatory action must be proportional to the initial attack from an adversary.<sup>21</sup> Legal scholar Paul Szass was even more explicit, stating "any first use of [nuclear] weapons would almost surely be illegitimate, as would any retaliatory use not strictly limited to the extent of the attack it was countering..."<sup>22</sup> Therefore, if Russia uses a very low-yield tactical nuclear weapon, a U.S. nuclear response with its existing arsenal would arguably violate the Just War principles of both discrimination and proportionality. As a result, the disproportionate yield of U.S. weapons may self-deter their use.

A nuclear state is self-deterred when it chooses not to use nuclear weapons for reasons other than military considerations (if a state chooses not to use nuclear weapons due to military considerations, then it has been successfully deterred by its adversary). According to T. V. Paul, there are three principal reasons that a state will be self-deterred: the tradition of non-use, the morality of nuclear weapons use, and legal concepts.<sup>23</sup> The tradition of non-use refers to the seven decades (and counting) since the last time nuclear weapons were used in combat, which has helped to reinforce a strong taboo against their employment. The moral implications of using nuclear weapons in combat are staggering, as the statesman who ordered the attack would be responsible for thousands, if not millions, of deaths, almost certainly including unarmed civilians and children. The legal concepts that contribute to self-deterrence are described above.

A state may also be self-deterred due to strategic political considerations. Using nuclear weapons may undermine the state's non-proliferation objectives. In addition, the employment of nuclear weapons by one state makes it more likely that other states will use them, potentially against the initial aggressor. Nuclear weapons may not be effective at destroying the target, as may be the case for certain deeply buried targets. For the United States in particular, the country that has been struck by nuclear weapons will need to be rebuilt, resulting in tremendous financial and personnel costs, with American military and civilians working in a contaminated environment. Since the long-term political goal of the United States is normally to befriend the citizens that have been "liberated" from their oppressive regime, the use of nuclear weapons would be clearly counterproductive to winning their hearts and minds. Finally, a nation may be self-deterred due to a self-serving desire to not undermine its own reputation (or the reputation of the leader).<sup>24</sup>

Why the United States Needs Low Yield Nuclear Weapons

States care more about what an adversary can credibly do with its nuclear weapons than what it says about them.

– Vipin Narang

The primary threat pushing the United States to develop low-yield nuclear weapons is Russia, which has been developing very low-yield weapons of its own to go along with its "escalate to de-escalate" doctrine. In 2002, Viktor Mikhailov, the director of the Sarov nuclear weapons laboratory in Russia, stated that work was underway to develop a very low-yield weapon that he described as a "nuclear scalpel" that could be used against conventional forces.<sup>25</sup> Russian defense expert Pavel Felgenhauer estimates the yield to range between 25 to 100 tons of TNT, or .025 to 0.1 KT.<sup>26</sup>

The centrality of nuclear weapons is noticeable in Russia's "escalate to deescalate" doctrine, in which they intend to make limited use of nuclear weapons to send a clear signal to their adversaries.<sup>27</sup> According to Russian doctrine, if they are losing in a conventional war, they may consider using nuclear weapons in order to demonstrate their resolve and stake in the conflict. They may simply test a nuclear weapon on their own territory, or they could use a tactical nuclear weapon directly against enemy forces. This, according to the theory, will compel their opponent to back down, thereby de-escalating the conflict on terms favorable to Russian interests.

Russia's increasing reliance on nuclear weapons, and especially tactical nuclear weapons, comes at the same time that the US has been reducing its tactical nuclear weapons stockpile. Following the end of the Cold War, the US unilaterally withdrew the overwhelming majority of its low-yield tactical nuclear weapons from Europe as part of the Presidential Nuclear Initiatives in 1991.<sup>28</sup> Presidents Bush and Gorbachev made reciprocal unilateral declarations to reduce and destroy their tactical nuclear weapons. Notably, the destruction of these weapons was never negotiated as part of a formal arms control treaty; both leaders were demonstrating good will by destroying weapons that were considered unnecessary in the contemporary global security environment. The formal nuclear arms reduction treaties focused on "strategic" nuclear weapons, since those were considered to be a greater threat to both sides.<sup>29</sup>

Most U.S. tactical nuclear weapons were destroyed by 2003. According to the Federation of American Scientists (FAS), the United States had approximately 400 tactical nuclear bombs, 100 Navy Tomahawk nuclear cruise missiles (stored on land), and 700 tactical nuclear weapons in inactive storage in 2009. In contrast, Russia retained approximately 2,050 operationally deployed tactical nuclear weapons with over 3,000 more in storage in that year.<sup>30</sup> In a 2016 update, FAS estimates that Russia has roughly 2,000 tactical nuclear weapons, which the Russian government claims are all in storage.<sup>31</sup> Other organizations estimate that Russia still has 5,000 tactical nuclear weapons.<sup>32, 33</sup> Similarly, FAS estimates that the United States now has 500 tactical nuclear weapons in the stockpile, all of which are B61 bombs. FAS assesses the yield of the B61 to range from 0.3 to 170 kt.<sup>34</sup>

The United States has not developed a new warhead since 1988<sup>35</sup>, and it ceased nuclear testing in 1992. As a result, the majority of fielded nuclear weapons and warheads are well past their design service life. Furthermore, the infrastructure that designs, builds, and sustains nuclear weapons is in disarray. The Pantex facility in Texas, where nuclear weapons are maintained, has a severe rat infestation, and the ceiling partially collapsed at the Y-12 National Security Complex in Oak Ridge, TN.<sup>36</sup> This has led prominent nuclear experts to say that the U.S. nuclear weapons enterprise is "rusting its way to disarmament."<sup>37</sup> Recent investment in the nuclear enterprise is beginning to reverse that trend, with a new plant in Kansas City and planned upgrades in other locations; time will tell if those projects are funded to completion.<sup>38</sup>

In 1993, the Spratt-Furse amendment prohibited the research and development of new low-yield nuclear warheads. This law was amended in 2003 to allow research, but maintained the prohibition on fielding low-yield weapons.<sup>39</sup> President Obama continued the prohibition on the development of new nuclear warheads in his 2010 Nuclear Posture Review.<sup>40</sup> As a result of these policies, the average age of America's nuclear arsenal is 29 years,<sup>41</sup> and the delivery systems, such as the Minuteman III ICBM and B-52 bomber are older still.

This severely reduces the effectiveness of U.S. nuclear deterrence. The failure to modernize nuclear warheads and delivery systems not only reduces the capability of the weapons themselves, it also undercuts the credibility of the United States. As recognized by deterrence experts since the days of Brodie and Schelling, a deterrent threat is far more effective if it is underwritten by an expensive investment. Failure to modernize nuclear capabilities "signals to adversaries that the United States is less committed to nuclear deterrence."<sup>42</sup> Fortunately, the United States has initiated the modernization of its nuclear weapons systems, which will be covered in more detail in the next section. However, under current policy, the United States has committed itself to not modernizing warheads, or improving the military capabilities of any of the weapons it is refurbishing.

The Soviet Union, and later Russia, did not follow suit on these American decisions. Russia did not declare a moratorium on developing new warheads, nor did it retire its massive inventory of tactical weapons. In fact, Russia has staunchly resisted American efforts to set up arms control agreements limiting the number of tactical nuclear weapons.<sup>43</sup> Instead, Russia has embarked on an ambitious modernization program, placing a greater reliance on nuclear weapons to offset U.S. conventional superiority.<sup>44</sup>

In summary, here is the situation facing the United States:

- Russia is modernizing its nuclear weapons and warheads, including the development of a very low yield nuclear weapon.
- Russia is increasing its reliance on nuclear weapons in general, as an offset to what they perceive as threatening Western conventional superiority.
- Russia, through its "escalate to de-escalate" doctrine, would consider using tactical nuclear weapons during a conventional conflict to demonstrate resolve and achieve tactical battlefield effects.
- The United States has created a policy that it is not allowed to develop new nuclear warheads, or create new nuclear weapons with improved military capability.
- The infrastructure supporting the nuclear enterprise has decayed to the point where it is unsafe for the people working there, and will require billions of dollars of upgrades to meet OSHA requirements, let alone support a mission requiring cutting-edge technology. Furthermore, most of the nuclear physicists who have any experience with building or testing nuclear warheads have retired.
- The average age of U.S. nuclear weapons is 29 years, which is well past the design service life of most systems. Sustainment of the systems is getting extremely costly, and without testing, it is unclear if the aging components, along with new and untested replacement parts, will be effective and reliable, despite the ongoing work in modeling and simulation. The United States has begun modernizing its weapons and delivery systems.

In order to counter the troublesome trends identified above, the United States needs to do three things. First, it must rebuild its nuclear infrastructure and recruit and retain the best nuclear physicists in the world. Second, the United States needs to modernize its nuclear weapons and delivery systems. Third, the United States needs to develop a very low yield nuclear weapon that will be a credible deterrent to prevent the combat employment, or coercive use, of adversary nuclear weapons. The first two proposals are already underway, so this analysis is focused on the very low yield nuclear warhead development.

There are two problems that are solved by developing a very low yield nuclear warhead: credibility and hardened, deeply buried targets. With the current weapons stockpile, the United States and NATO do not have a credible nuclear weapon to deter nuclear employment or coercion from Russia's escalation doctrine. This problem is not entirely new: it was recognized by Walt Rostow, a National Security Council staff member, in 1961: "We are often caught in circumstances where our only available riposte is so disproportionate to the immediate provocation that its use risks unwanted escalation or serious political costs to the free community. This asymmetry makes it attractive for Communists to apply limited debilitating pressures upon us in situations where we find it difficult to impose on them an equivalent price for their intrusions."<sup>45</sup>

This dilemma was clearly articulated in a recent NATO issue brief. The present nuclear arsenal available to NATO has significant capability gaps that could encourage Russia to make nuclear threats or actually use nuclear weapons. That would leave NATO in the unenviable position of either capitulating without a fight, or a grossly disproportionate response. "Currently, the United States and NATO do not have an obvious and credible response to a limited Russian nuclear strike. Such a capability is required, not so that NATO can fight a nuclear war, but rather to demonstrate that NATO has a credible response to any feasible scenario in order to deter Russia from conducting a nuclear attack in the first place."<sup>46</sup> John S. Foster, Jr., the former director of Lawrence Livermore National Laboratory, recommends filling the gap by developing a very low-yield nuclear weapon, along with a penetrating weapon to strike deeply buried targets.<sup>47</sup>

One of the primary issues facing the U.S. deterrent is the legal dilemma described above, notably the principles of proportionality and discrimination. <sup>48</sup> With the existing arsenal, the thermal and blast effects could not be contained to the battlefield. Russia and other adversaries know this, and they know that the United States would not want to risk the resulting collateral damage. Therefore, any threats made by the United States and its NATO allies would simply not be credible. If the United States had a very low yield nuclear weapon whose effects could be (mostly) contained to the battlefield, the same threat of retaliation may give the Russians pause.<sup>49</sup> This has led strategic policy groups to advocate rescinding the ban on developing new warheads, and nuclear weapons with improved capabilities,<sup>50</sup> a sentiment that was echoed by the Chairman of the House Armed Services Committee, Representative Thornton.<sup>51</sup>

The second problem that needs to be solved is that of hardened, deeply buried targets. Currently, rogue regimes around the world have weapons of mass destruction and command and control facilities buried deep underground in hardened bunkers. These targets cannot be held at risk by the existing conventional or nuclear weapons in the U.S. arsenal, allowing these countries to

Vetter

develop and store weapons of mass destruction with impunity. If the United States had clear and unequivocal intelligence that the rogue nation was about to employ weapons of mass destruction against the United States or its allies, or that the nation was going to transfer the weapons to terrorists, the United States does not have any effective options to eliminate the threat. Combining a very low yield warhead with a deep penetrating weapon would allow the United States to target these facilities while minimizing fallout and collateral damage.<sup>52</sup>

There is an ancillary benefit to developing new tactical nuclear weapons that must not be discounted. Despite the good intentions at the end of the Cold War, the result of the Presidential Nuclear Initiatives left Russia with approximately 10 times as many tactical nuclear weapons as the United States. Tactical nuclear weapons have never been part of any nuclear arms reduction treaty, and Russia has absolutely no incentive to negotiate with the United States to reduce their stockpile. If the United States was to develop and field a new class of tactical nuclear weapons that was perceived as threatening by the Russians, that may finally give the United States leverage to use in arms control negotiations. Paradoxically, the United States could spend billions of dollars to develop and field a new weapon, only to destroy it a few years later. Rather than a waste, many policy makers would consider that money well spent if it could convince Russia to dismantle its massive arsenal of tactical nuclear weapons.

The Argument Against Low Yield Nuclear Weapons

As long as [nuclear] weapons exist, the United States will maintain a safe, secure and effective arsenal to deter any adversary, and guarantee that defense to our allies.

– President Obama

There are five primary arguments against developing a very low yield nuclear weapon. First, many people contend that the existing U.S. arsenal is a sufficient deterrent for any existing or potential adversary. Second, the United States and NATO have overwhelming conventional superiority, making a nuclear response to a Russian nuclear weapon unnecessary. Third, there is a concern that creating a lower yield weapon will make it more useable, thereby reducing the nuclear threshold. Fourth, some people argue that developing a new warhead is too expensive. Finally, it is possible that Russia's weapon modernization and rhetoric don't actually pose a significant new threat to the West.

Some people argue that the US can successfully deter Russia, and any other adversary, with its existing nuclear arsenal. There certainly can be no doubt that the United States, along with its NATO allies, possesses a formidable military capacity. The United States remains in possession of over 1,700 strategic and tactical nuclear warheads, with many more in storage.<sup>53</sup> It is important to note that two very influential Air Force generals share this perspective. General Robin Rand, the commander of U.S. Air Force Global Strike Command, stated, "The current Air Force nuclear weapons inventory includes weapons that meet combatant commander requirements and U.S. nuclear strategic deterrence

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requirements."<sup>54</sup> Similarly, Lieutenant General Jack Weinstein, the Air Force's Deputy Chief of Staff for Strategic Deterrence and Nuclear Integration, stated that the B61-12 was sufficient to meet the needs of deterring Russia's tactical nuclear weapons.<sup>55</sup> In their responses, both men referred to the U.S. policy prohibiting the development of new nuclear warheads, so they may have been taking that into account as an immutable constraint.

At issue here is not whether the United States has the capability to inflict a massive amount of pain on Russia. The issue is whether or not Russia believes that the United States would actually use its nuclear weapons, particularly if Russia employed a tactical nuclear weapon with a far lower yield than any possessed by the United States. This particular argument has been thoroughly discussed in the previous section.

The United States and NATO also have an overwhelming conventional superiority over Russia or any other potential adversary. Therefore, some people argue that a nuclear response is completely unnecessary, since Russia can be punished effectively with conventional weapons.<sup>56</sup> There are two significant problems with this approach.

First, executing a significant conventional strike against Russian territory is an extraordinarily difficult undertaking. If NATO wanted to send a signal to Russia that could equate in any way to the employment of nuclear weapons, it can't just strike a minor target on the periphery. NATO would need to strike deep into Russia at a significant target. Otherwise, the failure to deliver a "real" response to a nuclear strike could welcome more nuclear strikes in the future. However, Russia has a very sophisticated Integrated Air Defense System (IADS). Striking a militarily significant target in Russia would require hundreds of aircraft sorties to take down the IADS in order to let a much smaller number of strike aircraft reach the target. This would require a very costly and time-consuming buildup of capabilities; it's possible that Russia could maneuver to a fait accompli before NATO forces are even in position to initiate a strike. Even worse, Russia's IADS may win the battle, resulting in a Russian victory over the NATO air strike package. On the other hand, a matching nuclear strike could be accomplished near the edge of the battlefield in minimal time, provided the United States has a weapon of similar yield. If the yield of the U.S. weapon is significantly higher than the Russian weapon, the counterstrike risks being perceived as escalatory, which could make matters significantly worse.

The second problem with a conventional response is that it may not send the right message to the world. As noted by the Atlantic Council, "deterrence is in the eye of the beholder."<sup>57</sup> Putin may be willing to accept a conventional response, especially since it would likely be slow, costly, and have limited effect (especially when compared to a nuclear weapon). A conventional response from NATO may actually encourage future nuclear strikes by an adversary, since the precedent would be set that they could use nuclear weapons without suffering a response in kind.

Some argue that developing a lower yield warhead would reduce the nuclear threshold, thereby making nuclear war more likely. However, the weapon does not drive the employment doctrine. Only the President of the United States can

authorize the use of nuclear weapons, with a full understanding of the impact of a nuclear response (as well as understanding the implications of failing to respond). Historical evidence has shown that each President has made a determination of the nuclear threshold based on the national interests at stake.<sup>58</sup> The goal of developing a low yield tactical warhead is not to make it "easier" to use nuclear weapons. On the contrary, the goal is to develop a warhead that is a credible deterrent to the low yield weapons being developed by other countries, particularly Russia.

Perhaps the most convincing argument against developing a new warhead is the cost. After decades of neglect, the United States has ramped up 10 major nuclear modernization efforts. New or refurbished systems include the B-21 bomber, Columbia Class submarine, Ground-Based Strategic Deterrent (GBSD) intercontinental ballistic missile, the B61-12 bomb, the Long Range Standoff (LRSO) air-launched cruise missile, and five significantly refurbished warheads for the B61, LRSO, and ballistic missiles. Also, the nuclear command and control system is receiving a major upgrade to take advantage of technologies that have emerged in the last several decades. In addition to all of the new equipment, the aging arsenal continues to be sustained at a high cost, including upgrades to the delivery systems and maintenance on the warheads. Finally, the infrastructure that builds and sustains the weapons is undergoing a complete overhaul. The estimated cost of the nuclear enterprise is a trillion dollars over the next 30 years.<sup>59</sup> In that context, it is reasonable to ask if the United States should also pursue an additional nuclear warhead.

At the height of the Cold War, the United States spent approximately 20% of its defense budget on nuclear weapons. This trailed off to approximately 2% after the cold war ended.<sup>60</sup> The programmed modernization will raise spending on nuclear weapons to 7.5% of the defense budget.<sup>61</sup> In this light, increasing the defense budget to incorporate fielding a new warhead may not be unreasonable, especially if an existing warhead from the past is able to meet the need. The Mk-54 Davy Crockett was a nuclear artillery shell and demolition mine that could be transported in a backpack, with a reported yield of 10 - 20 tons of TNT.<sup>62</sup> It is possible that this warhead design can be refurbished and reused, minimizing research and development costs. The United States would also need to develop the penetrating bomb body to make the weapon capable of reaching deeply buried, hardened targets.

Finally, there is cause to believe that Russia's modernization programs and nuclear doctrine do not pose a significant threat to the United States and NATO; at least, not any more of a threat than they always have. Early in the Cold War, due to Soviet conventional superiority, NATO relied heavily on its nuclear deterrent in a manner similar to what Russia is doing today. Russia's shifting and somewhat ambiguous escalatory doctrine may simply be an attempt to draw attention to its status as a nuclear power, giving the "threat that leaves something to chance" as described by Thomas Schelling.<sup>63</sup> Schelling actually described the process of using nuclear weapons early in a conventional conflict as a controlled means of signaling.<sup>64</sup>

However, evidence of an increased threat can be observed through Russia's conventional behavior. In the last decade, it has invaded Georgia, annexed the Crimean Peninsula, infiltrated Ukraine with unconventional conflict, and conducted a fierce air campaign in Syria. There can be no doubt that Russia has ratcheted up its offensive capabilities and actions far beyond mere rhetoric. While this certainly does not prove that the Kremlin intends to use nuclear weapons, the aggressive behavior indicates an increase in risk-taking.

### Conclusion

There are three principal recommendations based upon the foregoing analysis. First, the U.S. intelligence community should ascertain whether or not Russia and other countries are actively developing very low yield nuclear weapons that would give them an asymmetric capability. Unclassified sources have conflicted on this fundamental and critical fact. If no other countries are developing a very low yield nuclear weapon, then the need to create a U.S. weapon to deter it ceases to exist. However, there would still be value in creating a deep penetrating nuclear weapon to hold hardened, deeply buried targets at risk, especially in rogue nations.

Second, the Air Force and the Department of Defense need to prioritize the existing portfolio of nuclear modernization efforts, and determine where a new low-yield nuclear weapon fits into the mix. It is unlikely that the new warhead would justify cancelling any of the existing modernization programs. Although a new low-yield nuclear weapon would enhance deterrence, that does not inherently lead to the normative judgment that the weapon should be fielded. The ultimate decision on force structure needs to be informed by resource constraints and the prioritization of capabilities.

Finally, if the Air Force determines that the incremental gain in deterrence gained by the new weapon justifies its cost (including the opportunity cost if other programs are cancelled), the Department of Defense and executive branch must work with Congress to change legislation, and allow the development of the warhead. If the Air Force reuses an existing design, such as the Mk-54 Davy Crockett, it may be able to develop and field the weapon without the need for testing, making the prospects far more politically feasible. It would be more difficult for the United States to convince other world leaders of the need to conduct nuclear testing, even though the United States has not ratified the comprehensive test ban treaty.

Developing a very low yield nuclear weapon would fill a critical capability gap facing the United States and its allies. It would give the President the options that he or she needs to handle a crisis, and provide a credible response to a threat or actual use of a low yield nuclear weapon by an adversary. Some people may contend that the purpose of nuclear weapons is only deterrence and not employment, so the actual capabilities of the weapons do not matter. This is incoherent logic that completely misses the point of deterrence. "Deterrence depends on the capacity to carry out threats." Without developing the necessary capabilities, "allies will question U.S. assurances, adversaries will doubt U.S. threats, and a U.S. president may confront an escalating crisis without any acceptable options."<sup>65</sup> Responding to a nuclear attack with a conventional strike does more to lower the nuclear threshold than fielding a new warhead ever could; it would set a precedent to the world that the consequences of using nuclear weapons are very limited. The U.S. President should not be boxed in a corner where he must respond with a disproportionate and indiscriminate nuclear weapon, or back down and do effectively nothing. Otherwise, the United States paves the way for adversaries to blackmail it, with no credible deterrent to stop them.

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# **CHAPTER 8**

# Conclusions

The Nuclear Posture Review is taking place in a time of uncertainty and global instability. As the nuclear powers continue to modernize their arsenals and new forms of warfare are being developed, the United States must maintain a foundation in nuclear strategy in order to successfully deter conflicts around the globe. These papers have identified some of the significant issues that need to be debated and considered in the national security discussions surrounding the future of the U.S. nuclear posture.

Colonel Fairclough addressed the question of how current and future threats in the global security environment affect nuclear strategic deterrence posture. He employed a qualitative research approach using the dependent variable of nuclear strategic deterrence posture, and four independent variables: the future global security environment, a status quo where things are improving, a status quo where things are getting worse, and the occurrence of a game-changing event. Findings revealed that numerous complexities of the future global security environment as well as intricacies involving each scenario indelibly affect nuclear strategic deterrence posture. Ultimately, the strategy, modernization efforts, and force structure of the nuclear enterprise must adapt and maintain the ability to deter current and emerging threats in the next 20 years.

Bates examined the possibility of expanding the role of the current nuclear arsenal in order to assure extended deterrence to our allies as well as broaden the range of options available to the President of the United Sates. In proposing a way forward, she focused on what steps are crucial and why, along with some challenges that will need to be overcome for the expanded future role of nuclear weapons in our nation's defense. Some issues for consideration include removing the verbiage of "global zero" from U.S. strategy documents and developing EMP as a U.S. first-strike deterrent.

Lieutenant Colonel Cooper examined the provision of extended deterrence to U.S. partners in the Pacific, considering the increased threat postures of China and North Korea. Key to maintaining this capability is modernization of the nuclear enterprise, in particular the B-21 bomber and the Long Range Standoff nuclear cruise missile. In addition, modernizing the ballistic missile defense capability is vital to extended deterrence and assurance in the region. While there are

consequences to building missile defenses in the Republic of Korea, confidence building measures with China may avert an arms race.

Major Knapp took a broader view of extended deterrence, examining Europe, the Western Pacific, and the Middle East for challenges in maintaining strategic stability. As each region has particular unique challenges, a tailored deterrence framework is required in each case. The lack of stable liberal democracies in the Middle East presents a particular challenge, compounded by the numerous states that have historically sought to develop a nuclear weapons program. Given the probable future scenario of the Middle East, it is unlikely that extending the U.S. nuclear deterrent in that region would be viable, at least not without significant improvements in regional stability. Conventional deterrent options, however, could be employed.

Major Burdette examined how the Air Force could modernize its nuclear command, control, and communications as a coherent weapon system rather than viewing it as merely a sum of its many parts. Given that the system supports Navy and DoD missions as well as Air Force missions, it is possible that, without proper oversight, particular vital subcomponents may be unfunded, delayed, or out of sequence within the larger scope. By collaboratively resourcing and manning the overall system, the process of modernizing and implementing the system would be considerably improved.

Ms. Stark focused on the modernization of the ICBM, which has been a controversial discussion in that many critics believe the ICBM leg of the triad is a Cold War relic, not affordable given other defense priorities, and unnecessary in today's defense environment. Her analysis demonstrates that the ICBMs still provide value in deterrence strategy, pursuing life extension program may be more costly, and as compared to other elements of the triad, is the least expensive leg to modernize. By allowing the introduction of new technologies, the ICBM can continue to provide an important value to strategic deterrence.

Finally, Colonel Vetter provided an argument for improving capabilities for low-yield nuclear weapons. Given Russian (and other countries) interest in developing a low-yield nuclear weapon, possibly for first-strike use intended to "escalate to de-escalate," one must identify options for U.S. responses that are not grossly disproportionate or indiscriminate. The lack of capability could result in the U.S. government self-deterring itself from responding to such an attack. By investing in the U.S. nuclear infrastructure and modernizing nuclear weapons, the United States could develop a credible low-yield nuclear weapon with an ability to threaten hardened, deeply buried targets.

Critics of the DoD nuclear enterprise often suggest that nuclear weapons belong to the Cold War, and that they have no place in contemporary national security discussions. We believe that nuclear weapons will continue to have a significant role in at the least providing the foundation for successful U.S. conventional operations. The Nuclear Posture Review provides a forum to discuss and develop these issues at the highest political and military levels of power. These issues identified herein provide a starting point for those discussions.

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Providing Research and Education on WMD Threats and Responses for the US Air Force