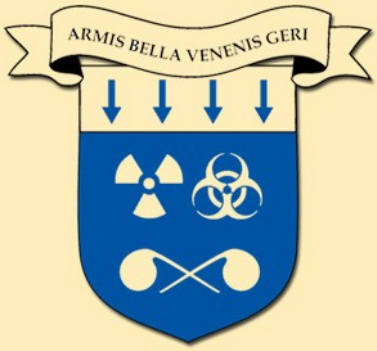
The Strategic Challenge of the U.S. Nuclear Arsenal:

AY14 Nuclear Issues Research Group

Edited by: Albert J. Mauroni



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

THE STRATEGIC CHALLENGE OF THE U.S. NUCLEAR ARSENAL:

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Preface

During the Academic Year 2014 (AY14), the U.S. Air Force Center for Unconventional Weapons (CUWS) hosted a Nuclear Issues Research Group elective for the U.S. Air War College. Twelve students 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. The class took two field trips: one to Washington, DC, to engage with Office of the Secretary of Defense policy makers, Joint Staff and Air Staff offices, the State Department, and the Central Intelligence Agency; and one to Lawrence Livermore National Laboratory to discuss the technical side of nuclear weapons.

Dr. Adam Lowther (U.S. Air Force Research Institute) led teaching of this nuclear elective and guided the development of the students' professional study papers toward a comprehensive discussion on nuclear deterrence issues for the 21st century. Dr. Grant Hammond (USAF Center for Technology and Strategy), Col Charles Patnaude (Air War College), and Mr. Al Mauroni (CUWS) were faculty advisors for the students in addition to Dr. Lowther. The results of their professional study papers are presented in this book. The students voluntarily elected to continue working on their papers after the course was completed, and those results will appear in a future book.

CHAPTER 1

The Future U.S. Nuclear Strategic Environment

Michelle K. Stinson

The United States will confront a wide array of security challenges in the future, including preserving strategic stability with a nuclear peer competitor, deterring nuclear use by rogue nations, dissuading smaller nuclear powers from nuclear arms races, preventing non-nuclear states from crossing the nuclear threshold, and preventing nuclear terrorism. These trends underscore the complexities of nuclear strategy, doctrine, and force structure design and support the premise that the United States must make quantitative and qualitative adjustments to its nuclear triad and current deterrence strategies to counter multiple nuclear threats in the future U.S. nuclear strategic environment. The U.S. strategic arsenal of the twenty-first century must maintain strategic stability with Russia and China, deter potential regional adversaries, and assure allies and partners under the U.S. nuclear umbrella.

In spite of the success of the nuclear deterrent – there has not been a world war in over 67 years, and thirty nations assured of protection under the U.S. nuclear umbrella have chosen not to develop their own nuclear weapons – many politicians and scholars are taking nuclear deterrence for granted. Nuclear abolitionists and other groups have been calling for reductions in the nuclear arsenal and a new commitment to a world without nuclear weapons. Other groups have proposed significant reductions in the number of nuclear weapons or reductions in the number and mix of nuclear delivery systems.

This paper will assess the future U.S. nuclear strategic environment from the perspective of U.S. nuclear policy, U.S. deterrence

policy, the cost and structure of the future U.S. deterrent, and the future threat environment in order to discuss the quantitative and qualitative adjustments that will be required for the U.S. nuclear triad and current deterrence strategies to counter multiple nuclear threats in the future. As long as these nuclear threats endure, the United States must have a strong nuclear deterrent that is safe, secure, and effective in meeting its security needs and those of its allies. Therefore, the United States must make quantitative and qualitative adjustments to its nuclear triad and current deterrence strategies in order to confront a wide array of security challenges in the future U.S. nuclear strategic environment, while maintaining a strong nuclear deterrent that is safe, secure, and effective in meeting its security needs and those of its allies.

Does the United States Need Nuclear Weapons?

The U.S. nuclear deterrent has been used every day since 1945 to ensure that an attack against the United States or its allies would be unthinkable, given the devastating nuclear response that would follow. Many former senior policy makers are leading the call for a commitment to a world without nuclear weapons.[1] This policy would leave the United States at a distinct disadvantage against nuclear competitors who are modernizing and growing the size of their arsenals. If the United States were to move ahead with drastic nuclear reductions, it could lack the means to deter these advanced systems or provide a credible nuclear umbrella to allies and friends. Drastic reductions could also prompt a new nuclear arms race with states that seek to obtain nuclear parity with the United States.

Proponents of cuts to the U.S. nuclear enterprise generally support three possibilities for decreasing or eliminating the strategic nuclear forces of the future: decreasing the size of the U.S. strategic nuclear arsenal through reductions in warheads but preserving the three delivery systems that make up the nuclear triad; eliminating one or more nuclear delivery systems; and/or deferring or canceling nuclear modernization programs.[2,3,4]

A New Direction for U.S. Nuclear Policy

The last four years have been historic in terms of setting a new and positive direction for U.S. nuclear strategy, policy, force posture, and funding. Proponents for cuts to the nuclear arsenal and nuclear abolitionists mistakenly declared victory in April 2009 when President Barack Obama pledged to pursue a world free of nuclear weapons during his address referred to as the "Prague speech."[5] While the speech did signal a new direction for the U.S. nuclear enterprise and U.S. nuclear policy, the President also announced that as long as nuclear weapons exist, the United States must "maintain a safe, secure, and effective nuclear arsenal to deter any adversary, and guarantee that defense to our allies."[6] President Obama has acknowledged that a world free of nuclear weapons is a long-term goal that would not be realized quickly. The speech prompted an examination of U.S. nuclear strategy, policy, and force posture that has resulted in renewed support and funding for the U.S. nuclear enterprise and the nuclear triad, while addressing the concerns of nuclear abolitionists with a new bilateral reduction agreement with Russia, a commitment to further cuts, and a pledge to eventually diminish the role of nuclear weapons in national security strategy.

With the Prague speech as guidance, the Department of Defense (DOD) led an interagency review to determine the future role of nuclear weapons and nuclear policy, to include declaratory policy, acquisition, deployment, and employment, resulting in the 2010 *Nuclear Posture Review* (NPR) *Report* that outlined five key priorities:

- Prevent nuclear proliferation and nuclear terrorism;
- Reduce the role of nuclear weapons;
- Maintain effective strategic deterrence and stability at lower nuclear force levels;
- Strengthen regional deterrence and reassurance of U.S. allies and partners;
- Sustain a safe, secure, and effective nuclear arsenal.[7]

The NPR confirmed the fundamental role of the U.S. nuclear force in national security and updated declaratory policy by pledging that the

United States will not retaliate with nuclear weapons against any nonnuclear state that abides by its Nuclear Non-Proliferation Treaty (NPT) commitments, relying instead on the threat of conventional military retaliation and ballistic missile defense (BMD) capabilities to deter or defend against an attack.[8] Additionally, the NPR confirmed that, while United States will not develop new nuclear weapons to replace those in the existing arsenal, it will retain a smaller nuclear triad of upgraded intercontinental ballistic missiles (ICBMs), strategic nuclear submarines (SSBNs), submarine-launched ballistic missiles (SLBMs), and heavy nuclear-capable bombers with modernized warheads and bombs, in order to "maintain strategic stability at reasonable cost, while hedging against potential technical problems or vulnerabilities."[9]

In April 2010, the United States and the Russian Federation signed the New Strategic Arms Reduction Treaty (START), mandating that both countries will limit their nuclear weapons to a maximum of 1,550 deployed warheads on no more than 700 deployed ICBMs, SLBMs, and heavy bombers by 5 February 2018.[10] During the advice and consent process for ratification of New START, the Obama administration agreed to request more than $214 billion through 2020 to maintain, replace, and upgrade the U.S. nuclear force and nuclear weapons production complex. This ended a long hiatus in weapon modernization and delivery system upgrades and supported the NPR policy that capable U.S. nuclear forces must be supported by a dynamic nuclear infrastructure and a resilient industrial base, particularly at lower numbers.[11]

In June 2013, President Obama announced the U.S. Nuclear Weapons Employment Strategy in order to translate the findings and conclusions of the 2010 NPR into more detailed guidance on the role and structure of nuclear forces for DOD planners.[12] While confirming the key objectives in the 2010 NPR, the strategy also includes the goal of eventually pursuing up to a one-third reduction in deployed strategic nuclear weapons from the level established in the New START Treaty, to just over 1,000 nuclear weapons, while avoiding any discussion of non-strategic weapons forward-deployed in Europe in support of the North Atlantic Treaty Organization (NATO).[13]

Shortly after the White House released the new strategy, DOD submitted the "Report on Nuclear Employment Strategy of the United States Specified in Section 491 of 10 U.S.C." to Congress on behalf of the

President. [14] The report assessed what changes to nuclear employment strategy could best support the five key objectives of U.S. nuclear weapons policies and posture outlined in the 2010 NPR and added a sixth objective: achieve U.S. and allied objectives if deterrence fails.[15]

The new Nuclear Employment Strategy has disappointed nuclear abolitionists and advocates of Global Zero, although it does include support for moderate steps to reduce the numbers and role of nuclear weapons. The strategy reaffirms the nuclear counterforce strategy and retains the nuclear triad. It also retains the capability to launch nuclear forces under attack, continues the current alert posture, retains strike options against conventional, chemical, and biological weapons, confirms support for nonstrategic nuclear weapons in Europe, supports the storage and maintenance of a hedge of non-deployed warheads, and endorses the production of modified interoperable warheads.[16]

A New Direction for U.S. Deterrence Policy

Effective deterrence in the future will continue to depend both on capability and credibility, requiring superior nuclear capabilities and the perception of a national will to respond to aggression with both nuclear and conventional weapons, but its practice will be complicated by the myriad of national and non-state actors that must be considered in developing effective and tailored deterrence strategies.

During the Cold War, deterrence focused on preventing nuclear war and nuclear proliferation and relied principally on a ready capability to retaliate against a Soviet surprise attack with a devastating response. The concept of Central Deterrence, supported by the assumptions and certainties of assured destruction, built stability into the relationship between the United States and the Soviet Union. The concept of Extended Deterrence provided security assurances for allies and partners under the U.S. nuclear umbrella and discouraged them from developing their own nuclear weapons. Nuclear weapons were used to operationalize strategies of denial and punishment. Denial strategies, generally termed "counterforce," focus on military targets, denying the adversary the ability to use its military forces, especially nuclear forces, in the event of a conflict. Punishment strategies, generally termed "countervalue," focus on

destroying the industrial capacity and urban centers of the adversary in order to impose unacceptable costs.

In the twenty-first century, an important aspect of deterrence planning will be to gain better insight into the strategic thinking of our adversaries and understand their motivations in order to tailor deterrence strategies and develop credible messaging for more focused and effective deterrence strategies.[17] A more tailored approach to the three traditional elements of deterrence – threat, denial, and dissuasion – with an emphasis on designing deterrence strategies that hold at risk what an adversary most values, will have greater possibilities for success.[18] The United States must develop nuclear deterrence strategies that are tailored for each potential adversary, from our nearest peer competitor (Russia), to rogue states, potential nuclear proliferators, and non-state actors.[19]

The Price of Deterrence in the Twenty-First Century

Costs for nuclear disposal, warhead modernization, and nuclear warhead delivery systems may be the greatest threat to the U.S. nuclear enterprise in the future, although they represent only a small percentage of the overall U.S. defense budget. It is unclear how long nuclear modernization programs can resist budgetary pressures in spite of current White House and Congressional support for nuclear modernization and procurement initiatives. To date, nuclear weapons expenditures have been protected from current budget cuts. The Continuing Resolution for fiscal year (FY) 2011 contained an exception to increase funds available for the National Nuclear Security Administration (NNSA), which manages the nuclear weapons complex.[20] DOD has also exempted nuclear forces from sequestration.[21] Then-Deputy Secretary of Defense Carter argued that the cost of the U.S. nuclear deterrent is very reasonable at around $16 billion per year, a figure that includes nuclear command-and-control costs.[22] The "1251 Report," a ten-year cost estimate for projected nuclear weapon investments, estimated in 2010 that the United States would spend about $214 billion during the years 2011-2020 to maintain and replace the U.S. deterrent force: $125 billion on DOD activities and $88 billion for NNSA weapons-related activities.[23]

According to the *Trillion Dollar Nuclear Triad*, the United States will spend approximately $1 trillion over the next thirty years to maintain

the current nuclear arsenal and procure a new generation of nuclear-armed or nuclear-capable heavy bombers, submarines, SLBMs, and ICBMs.[24] While to some these costs may seem excessive, they actually represent an average of only three percent of DOD spending[25] and one-third the cost of spending on agricultural subsidies. [26] However, the estimates do not include additional funds in case of delays or cost overruns, which could be as high as fifty percent over original estimates. The greatest challenge to nuclear procurement programs will be during the six-year period between 2024-2029 when DOD plans to purchase 5 submarines, 72 bombers, and 240 ICBMs to replace delivery systems that are set to retire beginning in 2030. [27] Rebuilding all three legs of the strategic triad simultaneously during this period could endanger either the ICBM force and/or the nuclear mission for the follow-on bomber if expenditure requirements force lawmakers to slow or cancel some nuclear programs. DOD articulated this risk in testimony before the House Armed Services Committee.[28]

Twenty-first Century Strategic Threats

During the Cold War, the strategic arsenals of the United States and Soviet Union had a stabilizing effect on superpower relations and international stability by making any major conflict unacceptably risky. Although the risk of a surprise dyadic nuclear exchange with Russia is now negligible, the U.S. nuclear arsenal of the twenty-first century must maintain strategic stability with Russia and China, deter regional aggression, and prevent nuclear proliferation by assuring U.S. allies and partners under the U.S. nuclear umbrella.

In the future, the United States and its allies must also be prepared for conventional wars with nuclear-armed adversaries. Faced with a superior conventional force, a weaker adversary might threaten to use nuclear weapons to stop a war short of regime collapse and total defeat. [29 , 30] NATO successfully used the concept of coercive nuclear escalation during the Cold War when planning to defend Europe from a superior Soviet conventional force. Any future adversary will likely consider the same strategy.[31,32]

There are now nine members of the nuclear club, according the Hans Kristensen and Robert Norris with the *Bulletin of the Atomic*

Scientists.[33] Although the strategic nuclear forces of China, as well as Pakistan, India, and North Korea, are not equal to those of the United States and Russia, they complicate regional stability and increase nuclear force structure requirements in support of U.S. extended deterrence agreements. All nine nuclear nations, with the exception of the United States and United Kingdom, have modernized or upgraded their nuclear arsenals.[34] Russia, France, China, Pakistan, India, and possibly Israel and North Korea, are likely to increase their nuclear weapons inventories, although none will reach parity with the United States and Russia for several decades unless both countries continue nuclear reductions as a result of additional bilateral agreements.

An overview of strategic nuclear forces and ballistic missile capabilities that may pose a threat to the United States and its allies, by tier according to number of warheads, delivery vehicles, and ballistic missile capabilities, along with a discussion of nuclear proliferation and nuclear terrorism threats, illustrates the complexity of the future U.S. nuclear strategic environment.

Tier One – Russia and China

Russia remains the United States' only peer in nuclear deterrent capabilities. It operates a nuclear triad with 1,800 operational warheads deployed on 326 ICBMs, 624 SLBMs on 10 SSBNs, and 810 warheads on 60 bombers.[35] Another 700 strategic warheads are in storage, along with 2,000 non-strategic warheads, probably maintained to confront threats from NATO and China. Russia is in the process of modernizing its nuclear triad, concentrating on its ICBM leg, and will replace its Soviet-era ballistic missiles with fewer, but improved, versions by 2023.[36] Russia successfully tested a new type of mobile ICBM in 2012, according to Russian press reports. The Russian SS-27 Mod 1, an ICBM designed to counter BMD systems, is now deployed in silos in six regiments. In addition, Russian officials claim to be developing a new class of hypersonic vehicle to allow Russian strategic missiles to penetrate missile defense systems. The Russian press has indicated that acquisition of a new rail-mobile ICBM is under consideration.[37]

China currently has an operational nuclear dyad with roughly 250 warheads for 150 ICBMs, and a small inventory of air-delivered nuclear

bombs.[38] China also has a nuclear weapons modernization program to achieve a nuclear triad, with SLBM production underway for three Jin-class SSBNs.[39] The number of Chinese ICBM nuclear warheads capable of reaching the continental United States could expand to well over 100 by 2025, although the United States would probably decide not to retaliate to a Chinese attack with ICBMs, since missiles launched from the central United States would have to overfly Russia to strike most potential targets in East Asia and the Middle East. [40,41] Estimates predict that China will add 10 warheads annually to its nuclear inventory, depending on requirements for additional delivery vehicles. [42] China, the world leader in diverse ballistic missile development, is developing advanced anti-access/area denial capabilities, including anti-ship ballistic missiles (ASBMs), that can threaten its neighbors and U.S. forces deployed in the region.[43] China continues to field very large numbers of conventionally-armed short-range ballistic missiles (SRBMs) opposite Taiwan. [44] Additionally, it is developing methods and weapons counter U.S. ballistic missile defenses. China is adding the DF-31A to the ICBM force. Future ICBMs may include multiple independently targetable reentry vehicles (MIRVs), depending on Indian plans to use MIRVs in the future.[45] According to press reports, China also recently tested a hypersonic glide vehicle that is intended to defeat ballistic missile defenses.[46]

Tier Two - India and Pakistan

Indian and Pakistani warheads are in storage and not operationally deployed. The two countries primarily focus their deterrent on one another, although Indian long-range weapons are designed to deter China from aggression. Pakistan maintains 100 to 120 warheads for air and medium-range ballistic missile (MRBM) delivery systems and has considered producing a variety of miniature nuclear warheads that would allow it to arm anti-ship missiles as well as nuclear torpedoes, nuclear depth bombs and nuclear naval mines.[47] Pakistan is also developing new delivery systems, to include a new nuclear-capable MRBM, two new nuclear-capable SRBMs, and two new nuclear-capable cruise missiles.[48] Pakistan recently announced that it will develop its own SSBN to counter the Indian SSBN threat.[49] India maintains 90 to 110 warheads for air, missile, and SSBN delivery systems, and it is planning to increase its

fissile material production capacity.[50] In 2012, India leased an SSBN from Russia for a period of ten years for use while it develops its own.[51] India conducted the first flight test of the Agni V ICBM in April 2012, and an even longer range ICBM is reportedly in the design phase. [52] India is considering development of a MIRV capability for its ICBM, which combined with increased U.S. missile defense capabilities in the Pacific region, could prompt China to do the same. [53] Pakistan continues to steadily expand its nuclear capabilities with the construction of two new plutonium production reactors and a new reprocessing facility.[54]

Tier Three - North Korea and Iran

North Korea continues development of the TD-2 ICBM/Space Launch Vehicle (SLV), which could threaten the United States if developed as an ICBM. Launches in July 2006, April 2009, and April 2012 ended in failure, but a December 2012 launch successfully placed a satellite in orbit.[55] In 2012, North Korea unveiled the new but untested Hwasong-13 road-mobile ICBM, which could also threaten the United States. In 2013 the Defense Intelligence Agency concluded, with moderate confidence, that North Korea may have developed a nuclear warhead small enough to be placed on a ballistic missile.[56]

While Iran has not yet developed its own nuclear weapons, it has an extensive missile development program that has received support from Russia, China, and North Korea.[57] The Iranian Shahab 3 MRBM, based on the North Korean No Dong missile, has been modified to extend its range and effectiveness, with the longest-range variant reportedly being able to reach targets at a distance of about 2,000 kilometers.[58] Iran has conducted multiple launches of the Sejjil, a solid-propellant MRBM with a claimed range of 2,000 km. In addition, it has conducted multiple launches of the Safir, a multi-stage SLV that serves as a test bed for long-range ballistic missile technologies. [59] Economic sanctions and international pressures have brought Iran to the negotiating table, but it continues its efforts to develop weapons-grade uranium and weapon delivery systems.[60]

Tier Four – Nuclear Proliferation

There is clear evidence in diplomatic channels that U.S. nuclear security assurances through extended deterrence agreements continue to

be the single most important reason that thirty nations have foresworn nuclear weapons to date.[61] If there is any doubt about the U.S. nuclear umbrella, allies and partners may acquire their own nuclear arsenals. History has shown how difficult it is to compel a state to cancel a successful nuclear program once started. South Africa and Libya are success stories, but Syria continued its effort to join the nuclear club until its North Korean-built complex was destroyed by Israel.[62] Recent North Korean attempts to transport nuclear technology to other countries have been denied. Saudi Arabia was recently reported to be seeking a nuclear capability from Pakistan as a counter-balance to the threat from Iran, which could lead to a nuclear arms race in the region.[63] In addition to Saudi Arabia, Egypt, the United Arab Emirates, and Turkey could seek to acquire nuclear weapons since they believe that an Iran in possession of a nuclear deterrent might feel so safe from U.S. or Israeli retaliation that it could act far more aggressively to dominate the Middle East and increase support to Hezbollah, Hamas, and other terrorist and insurgent groups.[64]

Agreements to support allies under the U.S. BMD umbrella are also enhancing credibility for assurance and extended deterrence, and thus discouraging proliferation, in the face of growing threats from short-range, medium-range, and intermediate-range ballistic missiles in regions where the United States maintains security relationships.[65]

Tier Five – Nuclear Terrorism

Michael Levi, in *On Nuclear Terrorism*, discusses the practical difficulties terrorists face in acquiring and detonating a nuclear weapon.[66] Even if a terrorist group succeeded in buying or stealing sufficient fissile material, the construction of a nuclear weapon or improvised nuclear device is beyond the technical capabilities of terrorists.[67] A terrorist group could steal a nuclear weapon, complete with ignition device, but would face difficulties in overcoming Safing, Arming, Fusing, and Firing (SAFF) procedures that could include required changes in altitude, acceleration, or other factors for detonation.[68] The easiest weapon to acquire is a non-nuclear device called a "dirty bomb," or radiological dispersal device (RDD), that theoretically would disperse radioactive material by combining it with conventional explosives.[69] Alternatively, a nuclear state could sell or provide a terrorist with a nuclear weapon and the means to

detonate it, but there is little evidence to support this scenario, given the negative consequences that would result from an accidental detonation or retaliation against the state that supplied the weapon. Libya, Iraq, and Iran stopped sponsoring terrorist strikes against the United States after attacks were attributed them.[70] A more likely scenario involves terrorist use of a nuclear weapon for purposes of blackmail or propaganda.[71] Finally, in a failed-state situation in Pakistan, terrorists could gain access to nuclear weapons, but they would have to convince a group of trained military personnel to assist them to launch the weapon, which is unlikely due to fear of retribution or accident. Additional barriers to terrorist success in this scenario include: Pakistani SAFF features that prevent unauthorized use; separate nuclear storage facilities and delivery systems dispersed throughout Pakistan; and nuclear warheads that are stored unassembled, with cores separate from the weapons.[72]

Conclusion and Recommendation

To cope effectively with the current and future multi-tiered threat environment, the United States must maintain an effective nuclear deterrent that is both capable and credible. This will require safe and effective nuclear weapons, new delivery systems, and tailored deterrence strategies that communicate the will of the United States to respond decisively to any aggression against itself or its allies and partners. The U.S. nuclear triad provides the complementary mix of survivable, flexible, and responsive capabilities needed to support the range of options that may be required to confront multiple threats in the future – as long as modernization funding continues without interruption. Tailored deterrence strategies that hold at risk what the adversary values most will ensure that the nuclear triad can effectively provide strategic stability, discourage proliferation while assuring allies and partners, and deter regional aggression. Table 1 summarizes the quantitative and qualitative adjustments the United States must make to its nuclear triad and current deterrence strategies in order to confront a wide array of security challenges in the future U.S. nuclear strategic environment. It uses the Cold War as a reference point to highlight the changes in deterrence policy, nuclear force structure, and the addition of conventional weapons

and theater missile defense that will be required to support the twenty-first century deterrence mission.

	Cold War Deterrent	Twenty-first Century Deterrent
Threat	Soviet Union	Multiple nuclear states, nuclear aspirants, nuclear proliferation, and nuclear terrorism
U.S. Nuclear Force Structure	Nuclear triad with over 10,000 warheads deployed on 2,000 launchers[73]	Nuclear triad with 1,550 strategic warheads deployed on 700 strategic delivery vehicles
Deterrence Focus	Deterrence by punishment (countervalue) and denial (counterforce)	Deterrence by dissuasion, denial, threat, and compellence using nuclear and conventional deterrent forces
Deterrence Policy	Central Deterrence and Extended Deterrence	Central Deterrence, Extended Deterrence, and Tailored Deterrence
Strategic Nuclear Force Mission	Maintain strategic stability with the USSR and assure U.S. allies under U.S. nuclear umbrella	Maintain strategic stability with Russia and China, deter potential regional adversaries, and assure U.S. allies and partners
Stockpile Modernization/ Procurement	More generous budgets based on Cold War national security priorities	Budgetary pressures that create significant risk if modernization and/or acquisition programs are delayed
Allies and partners	Assure under U.S. nuclear umbrella	Assure under U.S. nuclear umbrella and U.S. theater missile defenses

Table 1. Comparison of Cold War and Twenty-First Century Deterrence[74]

Recommendation: Maintain the Momentum for Modernization

The last four years have been historic in terms of setting a new direction for the U.S. nuclear enterprise. The United States has a new Nuclear Employment Strategy that confirms the fundamental role of the nuclear triad in national security. Proponents of the strategic nuclear force appear to have won for the time being. It is time to end the debate over

triad legs and nuclear abolition in order to focus instead on funding to support nuclear modernization and procurement programs. Funding is finally available to modernize weapons or acquire new delivery systems but may soon become the biggest threat to the nuclear enterprise. The Monterey Institute of International Studies has received a lot of attention for their 2014 study, *The Trillion Dollar Nuclear Triad*. [75] The report estimates that the United States plans to spend approximately $1 trillion over the next 30 years to maintain the nuclear enterprise, procure replacement systems, and upgrade existing nuclear warheads. [76] Procurement of delivery systems and warheads will peak during a four- to six-year window after 2023 and may lead policy makers and lawmakers to delay funding for modernization and acquisition due to a mistaken perception of excessive cost during this period.[77] According to the study, the United States will actually spend only three percent of its defense budget on modernization efforts, which represents a very cost effective effort in support of a 24-hour nuclear deterrent that has suffered previously from delays and cancellations in upgrades due to budget constraints. Extending the "procurement holiday" for the nuclear enterprise could result in even higher future costs while undermining the credibility of the U.S. nuclear deterrent. Under extreme budgetary pressures, policy makers might be forced to cancel one or both of the Air Force triad legs. [78] The United States must continue to fund NNSA modernization initiatives and acquisition of new delivery systems or be prepared to accept significant risk of technical failure as warheads and delivery systems age far beyond the dates they were designed to be effective.

Notes

1. . George P. Shultz et al., "A World Free of Nuclear Weapons," *Wall Street Journal*, 4 January 2007, A15.

2. James Wood Forsyth, Jr., Colonel B. Chance Salzman, and Dr. Gary Schaub, Jr., "Remembrance of Things Past: The Enduring Value of Nuclear Weapons," *Strategic Studies Quarterly*, Spring 2010, 83. Woods, Forsyth, and Shaub propose that the strategic arsenal could be reduced to small number of counterforce and countervalue weapons

totaling just over 300 for an effective minimum deterrent, and the authors support preserving the three legs of the nuclear triad. They believe that China, India, Pakistan, North Korea, and, presumably, Iran understand that a small number of nuclear weapons would be all that is needed for deterrence to be effective if both civilian (countervalue) and military (counterforce) targets are part of the adversary's risk calculation.

3. George Perkovich, *Do Unto Others: Toward A Defensible Nuclear Doctrine.* (Washington, DC: Carnegie Endowment for International Peace, 2013), 66. Perkovich agrees that a total of 300 warheads would be a sufficient deterrent, but under two conditions: if China were to forgo further expansion of its nuclear arsenal, and if U.S. friends and allies in Asia could be persuaded that reductions in U.S. capabilities would not increase the threat of aggression from North Korea and China.

4. . General (ret.) James E. Cartwright et al., *Global Zero U.S. Nuclear Policy Commission Report: Modernizing U.S. Nuclear Strategy, Force Structure and Posture.* (New York: Global Zero, 2012), 6. Advocates of "Global Zero," the international movement for the eventual elimination of all nuclear weapons, support a nuclear arsenal of 900 total strategic nuclear weapons but propose eliminating non-strategic weapons along with the Minuteman intercontinental ballistic missile force over the next ten years. The notional force recommended would consist of ten ballistic missile submarines armed with 720 warheads and eighteen B-2 bombers armed with 180 gravity bombs.

5. . White House, Office of the Press Secretary, "Remarks by President Barack Obama," 5 April, 2009, On-line, Internet, available from www.whitehouse.gov/ the_press_office/Remarks-By-President-Barack-Obama-In-Prague-As-Delivered.

6. Ibid.

7. U.S. Department of Defense, *Nuclear Posture Review Report.* (Washington, DC: U.S. Department of Defense, Office of the Secretary, 2010), 2.

8. Ibid., viii.

9. Ibid., 21.

10. U.S. Department of State, "Treaty Between the United States of America and the Russian Federation on Measures for the Further Reduction and Limitation of Strategic Offensive Arms," 8 Apr 2010, 3. New START entered into force on 5 February 2011. It is expected to remain in effect until at least 2021. The United States agreed to limits by 5 February 2018 of 1,550 accountable strategic warheads, 700 deployed strategic delivery vehicles, and a combined limit of 800 deployed and non-deployed strategic launchers; to maintain the U.S. nuclear triad of ICBMs, SLBMs, and nuclear-capable heavy bombers; and to modify ICBM payloads from existing multiple independently targetable reentry vehicle warheads to a single warhead each. The total number of deployed warheads may

exceed the 1,550 limit by a few hundred because only one warhead per bomber is counted, regardless of how many warheads the bomber actually carries. Contributions by non-nuclear systems to U.S. regional deterrence and reassurance goals are preserved by avoiding limitations on missile defenses and preserving options for using heavy bombers and long-range missile systems in conventional roles.

11. Jon Wolfsthal, Jeffrey Lewis, and Marc Quint, *The Trillion Dollar Nuclear Triad.* (Monterey, CA: James Martin Center for Nonproliferation Studies, 2014), 7. The White House agreed to request $88 billion for modernizing the nuclear complex and another $125 billion for sustaining and modernizing nuclear delivery systems.

12. Following the release of the 2010 NPR and ratification of the New START Treaty, the President directed DOD, the Department of State, Department of Energy, and the intelligence community to conduct an analysis of U.S. nuclear deterrence requirements and policy in order to ensure U.S. nuclear posture and plans are aligned to the twenty-first century security environment. This study resulted in the *Nuclear Weapons Employment Strategy of the United States.*

13. Ibid. The goal of a one-third reduction from New START levels, to just over 1,000 nuclear weapons, would be dependent on a verifiable bilateral agreement with the Russian Federation to cut its own stockpile to match U.S. cuts.

14. U.S. Department of Defense, *Report on Nuclear Employment Strategy of the United States Specified in Section 491 of 10 U.S.C.* (Washington, DC: Government Printing Office, 2013).

15. Ibid., 2.

16. Ibid., 5-6. The stockpile "hedge" is required in case of technical failure of a critical system or additional requirements due to "unforeseen geopolitical changes."

17. Jeffrey S. Lantis, "Strategic Culture and Tailored Deterrence: Bridging the Gap between Theory and Practice," *Contemporary Security Policy*, 30, no.3, December 2009, 467–485. For Elaine Bunn, a policymaker and strategist quoted by Lantis, this represents "a shift from a one-size-fits-all notion of deterrence toward more adaptable approaches suitable for advanced military competitors, regional weapons of mass destruction states, as well as nonstate terrorist networks…deterrence is about influencing the perceptions – and ultimately, the decisions and actions – of another party… and may well differ in each circumstance or scenario."

18. Barry R. Schneider and Patrick D. Ellis, *Tailored Deterrence: Influencing States and Groups of Concern.* (Maxwell Air Force Base, AL: United States Air Force Counterproliferation Center, 2012), 6.

19. Ibid., 7.

20 . Senate Committee on Appropriations, Energy and Water Development Subcommittee, *FY2011 Continuing Resolution*, On-line, Internet, available from appropriations.senate.gov/news.cfm?method=news.download&id=00ec20a3-ed78-4cb4-bfc8-65a048999b60.

21. Department of Defense, "Remarks by Deputy Secretary of Defense Carter at the Aspen Security Forum at Aspen, Colorado," 18 July 2013, On-line, Internet, available from www.defense.gov/transcripts/transcript.aspx?transcriptid=5277.

22. House Armed Services Committee, Subcommittee on Strategic Forces, *The Current Status and Future Direction for U.S. Nuclear Weapons Policy and Posture*, 112th Congress, 1st session, 2 November 2011, On-line, Internet, available from www.gpo.gov/fdsys/pkg/CHRG-112hhrg71527/html/CHRG-12hhrg71527.htm.

23. *National Defense Authorization Act of FY2010 Section 1251 Report*, November 2010 Update.

24. Wolfsthal et al., 11. The $1 trillion estimate includes:

- $100 billion for 100 long-range nuclear heavy bombers. This includes $45 billion required to develop a new bomber. An additional $30-40 billion will be needed to provide the modernized warheads for these bombers.

- $20-120 billion for a new generation of ICBMs. The highest end projection includes funding to make the new ICBMs mobile or implement other basing options.

- $350 billion in funding for NNSA to maintain current stockpiles and continue warhead modernization and life-extension programs. This averages over $11 billion per year, although Congress has refused to provide more than $8 billion annually in the most recent budget.

25. Ibid.

26. "A Trillion in the Trough: Congress passes a bill that gives bipartisanship a bad name," *The Economist*, 8 February 2014, 1.

27. Wolfsthal et al., 9.

28. . House Armed Services Committee, Strategic Forces Subcommittee, "Fiscal Year 2014 Budget Request for Atomic Energy Defense Activities and Nuclear Forces Programs," 9 May 2013, On-line, Internet, available from armedservices.house.gov/ index.cfm/2013/5/fiscal-year-2014-budget-request-for-atomic-energy-defense-activities- and-nuclear-forces-programs.

29. . General Sundarji from India reportedly remarked after the first Gulf War, "Never fight the Americans without a nuclear weapon." Countries ranging from North Korea to Iran to Pakistan have learned this lesson by observing U.S. conventional operations since the first Gulf War.

30. As quoted in Perkovich, *Do Unto Others*, 17, the former Director of National Intelligence, Admiral Dennis Blair, addressed this possibility: "The most likely circumstances of nuclear exchanges in these wars arise from American military superiority at the conventional level of war. With the United States on the way to victory, the governments of North Korea, China or Iran might threaten or actually use nuclear weapons to attempt to stop the war short of complete defeat."

31. Additional examples underscore the point:

- For example, if American and South Korean military forces were advancing on Pyongyang in response to conventional aggression, the North Koreans would likely use everything in their arsenal, to include nuclear weapons, to avoid defeat and regime change.

- If Iran decides to block the Strait of Hormuz, the Iranian regime could threaten nuclear retaliation if the United States decided to resolve the situation by force.

- Russia has already threatened to use nuclear weapons against Poland and NATO ballistic missile sites in in the event of a large scale conflict.

- If China decides to resolve its sovereignty claims in the South and East China Seas militarily, the United States may be forced into a direct conflict with China in defense of U.S. allies with counter-claims, to include Japan and the Philippines. China could defend against U.S. "aggression" and avoid a naval confrontation by using space, cyber, or other asymmetric weapons that could lead to escalation with the United States.

32. Keir A. Lieber and Daryl G. Press, "The Nukes We Need: Preserving the American Deterrent," *Foreign Affairs*, 88, no. 6, November/December 2009, 39-51; and Keir A. Lieber and Daryl G. Press, "The New Era of Nuclear Weapons, Deterrence, and Conflict," *Strategic Studies Quarterly*, 7, no.1, Spring 2013, 3-12. Lieber and Press argue that the idea of countries escalating conflict to avoid conventional defeat is well grounded in history.

33 . Hans M. Kristensen and Robert S. Norris, "Global Nuclear Weapons Inventories, 1945-2013," *Bulletin of the Atomic Scientists*, 2 September 2013.

34. Kristensen and Norris, "Global Nuclear Weapons Inventories," 75.

35. Hans M. Kristensen and Robert S. Norris, "Russian Nuclear Forces, 2013," *Bulletin of the Atomic Scientists*, 2 May 2013, 71.

36. Ibid.

37. Kristensen and Norris, "Global Nuclear Weapons Inventories," 75.

38. Ibid.

39. Hans M. Kristensen and Robert S. Norris, "Chinese Nuclear Forces, 2013," *Bulletin of the Atomic Scientists*, 1 November 2013, 80. China has two types of SLBMs for two types of SSBNs, but neither missile is operational.

40. National Air and Space Intelligence Center (NASIC), Public Affairs Office, *Ballistic and Cruise Missile Threat*, by NASIC, the Defense Intelligence Agency (DIA), the Missile and Space Intelligence Center (MSIC), and the Office of Naval Intelligence (ONI). (Wright-Patterson Air Force Base, OH: 2013), 3.

41. Evan B. Montgomery, *The Future of America's Strategic Nuclear Deterrent*. (Washington, DC: Center for Strategic and Budgetary Assessments, 2013), 21. This constraint raises the possibility that Moscow could mistake a nuclear strike against China as an attack on Russia and possibly discourage U.S. policymakers from choosing to respond with ICBMs except under extreme circumstances.

42. Kristensen and Norris, "Chinese Nuclear Forces," 80.

43. NASIC, *Ballistic and Cruise Missile Threat*, 3.

44. Ibid.

45. Ibid.

46. Mike Hoffman, "Congress Reacts to Chinese Hypersonic Missile Test," *Defense Tech*, 14 January 2014.

47. Hans M. Kristensen and Robert S. Norris, "Pakistan's Nuclear Forces, 2011," *Bulletin of the Atomic Scientists*, 1 July 2011, 91.

48. NASIC, *Ballistic and Cruise Missile Threat*, 3.

49. Usman Ansari, "Pakistani Navy to Develop Nuclear-Powered Submarines: Reports," *Defense News*, 11 February 2012.

50. Kristensen and Norris, "Global Nuclear Weapons Inventories," 77.

51. Palash Ghosh, "India Joins Nuclear Submarine Community; Pakistan Alarmed," *International Business Times*, 4 April 2012.

52. NASIC, *Ballistic and Cruise Missile Threat*, 18.

53. Kristensen and Norris, "Global Nuclear Weapons Inventories," 77.

54. Kristensen and Norris, "Pakistan's Nuclear Forces," 91.

55. Ibid.

56. . Thom Shanker, David Sanger, and Eric Schmitt, "Pentagon Finds Nuclear Strides by North Korea," *New York Times*, 11 April 2013. The DIA assessment cautions that the nuclear weapon's "reliability will be low," due to technical issues with delivery systems and weapons design.

57. NASIC, *Ballistic and Cruise Missile Threat*, 14.

58. Ibid.

59. Ibid.

60. Ashish Sen and Douglas Ernst, "Iran Official: Sanctions 'Utterly Failed' to Stop Nuclear Program," *Washington Times*, 4 December 2013. In a recent interview, Iranian Foreign Minister Zarif boasted, "When sanctions started, Iran had less than 200 centrifuges. Today Iran has 19,000 centrifuges, so the net product of the sanctions has been about 18,800 centrifuges that have been added to Iran's stock of centrifuges."

61. U.S. Department of State, International Security Advisory Board, "Report on Discouraging a Cascade of Nuclear Weapons States," (Washington, DC: Department of State, 2007), 22–23. "This umbrella is too important to sacrifice on the basis of an unproven ideal that nuclear disarmament in the U.S. would lead to a more secure world…. A lessening of the U.S. nuclear umbrella could very well trigger a cascade [of nuclear proliferation] in East Asia and the Middle East."

62. Lawrence Freedman, *Deterrence*. (Cambridge, MA: Polity Press, 2004), 121.

63 . Ali Ahmad, "The Saudi Proliferation Question," *Bulletin of the Atomic Scientists*, 13 December 2013, 1. In May 2012, Dennis Ross, a senior U.S. diplomat and a former envoy to the Middle East, confirmed that in April 2009 King Abdullah explicitly told him, "If they [Iran] get nuclear weapons, we will get nuclear weapons."

64 . Stephen Pifer et al., "U.S. and Extended Deterrence: Considerations and Challenges," *Brookings Arms Control Series*, Paper 3. (Washington, DC: The Brookings Institution, 2010), 523-557.

65. Ibid.

66. Michael A. Levi, *On Nuclear Terrorism.* (Cambridge, MA: Harvard University Press, 2007), 27.

67. Ibid., 28, 30, 35. Studies suggest that the price of a nuclear weapon, several million dollars, would be too high for today's terrorist groups. Additionally, the financial transaction required for payment has a high probability for discovery.

68. Ibid., 125.

69. Nuclear Regulatory Commission, "Fact Sheet on Dirty Bombs," 27 December 2012, 1, On-line, Internet, available from www.nrc.gov/reading-rm/doc-collections/fact-sheets/fs-dirty-bombs.html. The primary impact of an RDD would be mass panic and terror since there would not be enough concentrated radiation in the affected area to cause severe illness or death.

70. Freedman, 121.

71. Adam Lowther, *Challenging Nuclear Abolition.* (Maxwell Air Force Base, AL: Air Force Research Institute, 2009), 18.

72. Kristensen and Norris, "Pakistan's Nuclear Forces," 94.

[73]. Kristensen and Norris, "Global Nuclear Weapons Inventories," 76.

74. Adapted from James M. S. Smith, "The New Strategic Framework, the New Strategic Triad, and the Strategic Military Services," *Nuclear Transformation: The New U.S. Nuclear Doctrine,* (New York: Palgrave Macmillan, 2005), 134, and author's analysis and opinion.

75. Wolfsthal et al., 4.

76. Ibid.

77. Ibid.

78. Ibid.

CHAPTER 2

Deterring Iran and Assuring Mideast Partners: A Look at the Key Elements for U.S. Nuclear Assurance in the Middle East

Bobby C. Woods, Jr.

Given Iran's unwillingness to stop uranium enrichment,[1] it may be time for the United States Government (USG) to be realistic concerning the current policy and the likelihood that Iran has progressed to the point where it now possesses an Iranian "opaque or virtual" nuclear weapon. The USG should start immediately implementing a Middle East extended deterrence strategy and a more realistic security framework that could effectively contain and deter a nuclear-armed Iran and assure partner nations in the Middle East through U.S. extended deterrence agreements. The United States should continue efforts to keep Iran from taking the final step toward nuclear weapons, but should also be taking simultaneous actions to create – with partners in the region – the appropriate extended deterrence (assurance) security structure that would be effective in preventing proliferation. Deterring Iran from using nuclear weapons is only part of the strategic task. The tougher challenge is developing a U.S. strategy that effectively assures partner nations, like Saudi Arabia, of U.S. security commitments in order to limit nuclear proliferation in the Middle East. Any attempts to assure these partners will require a great deal of work, given waning U.S. credibility in the region. USG credibility has suffered because of a number of strategic policy decisions pertaining to the region. Much work is left to be done on this problem and the current official policy that "Iran will not get a nuclear weapon"[2] is preventing any official dialog regarding assurance of partner Arab nations in the Middle East. Unfortunately, even USG initiation of any formal discussions on an extended deterrence regime with these partners would likely be seen as an

admission of American policy failure. Meanwhile, Saudi Arabia has likely worked or is working arrangements whereby it could quickly realize a nuclear weapons capability if Iran does so or if it believes that Iran has done so.[3] The United States is very likely at a point where it will have to either offer extended deterrence to friendly Arab nations like Saudi Arabia or accept the consequences of not offering it and risk an exponentially increased likelihood of proliferation. Any further delay in offering an assurance framework could further jeopardize USG credibility and the likelihood of them accepting an American offer in the future.

The United States Air Force (USAF) could play a key role in providing credibility of U.S. nuclear capabilities and demonstration of American capability, commitment, and will to protect partner Arab nations and deter Iran. USAF airpower provides unique capabilities that can deter Iran but that deterrence is dependent on clear USG policy demonstrating political will, which must be associated with the capability. The presence of non-strategic American nuclear-capable airpower in the region or demonstration of global strike capabilities can reinforce ongoing diplomatic efforts, deter Iran, and assure regional Arab partner states so that they do not proliferate. The USG would have to work hard to convince partner Arab nations of American credibility and willingness to protect them; if American attempts to convince or assure partners fail, the likelihood of proliferation will exponentially rise.

Decreased U.S. Credibility with Partner Arab Nations

President Obama has repeatedly said that the United States will "do what we must" to stop Iran from getting nuclear weapons,[4] but friends in the region have not observed American action that would give credence to such a statement. USG actions dating back a decade or more led to the support of a Shia (vs. Sunni) dominated government in Iraq, even after Gulf Cooperation Council partner nations expressed deep concern about such a state of affairs in Iraq. Saudi Foreign Minister Saud al-Faisal said that the 2003 American invasion of Iraq was a gift to Tehran on a "silver platter."[5] This was the first of several American actions that has led to a rift between the USG and Saudi Arabia. To complicate matters, USG policy decisions to support pro-democracy protestors over Middle East stability and security have left friends in the region questioning U.S.

strategic actions. American credibility has declined to a point where any offers of extended deterrence may not be accepted because of friendly Arab perception that the United States cannot be trusted to ensure Arab security from a nuclear-armed Iran. Unwillingness by USG officials to support President Mubarak in Egypt after years of bilateral cooperation also weakened the relationship between the United States and its Arab partners. In supporting the Arab Spring, which led to the election of the Muslim Brotherhood in Egypt, USG policy played a role in causing great instability and concern by other friendly governments in the region. Regional friends are now asking if the United States can be trusted and if the United States will be there if and when they need help. There is a perception that the USG placed more emphasis on a values-based "democratization" agenda than on an interest-based stability and security strategy in the Middle East.

Friendly Arab nations have real concerns that the United States cannot be depended upon to ensure stability and peace. USG support of Egyptian "pro-democracy protestors" (i.e., Muslim Brotherhood) reinforced perceptions of "U.S. policy incoherence," likely sent the wrong message, and is probably not the right strategy.[6] The Saudis have vowed that the kingdom will make a "major shift" away from the United States as it no longer wants to be in a situation where it is dependent on the USG.[7] Saudi frustration with USG actions and policies with respect to Syria, the lingering Palestinian issue, proliferation concerns, and the perceived warming of relations with Iran was highlighted when, after lobbying and working for a seat on the United Nations (UN) Security Council, the Saudis refused to accept the seat in protest.[8] The effect of USG setting "redlines" in Syria, and then perceived inaction when those lines were crossed, led some to suggest "…the damage to U.S. credibility may be terminal."[9] The Obama administration has recognized this issue and has taken steps to stabilize and enhance the security situation in friendly nations, like Jordan, in the region. But it is difficult to change the perceptions of people on the streets even though relationships on a government-to-government level are fairly strong in countries like Jordan but remain cool with nations like Saudi Arabia.

Perceived "warming" of relations between the United States and Iran has caused significant uneasiness with Arab partners. USG pursuit of policies that ensure and support Arab partner nation stability and security

would help improve American credibility. Unfortunately, some key USG decisions have had a destabilizing effect in partner nations and have helped create a gap in American credibility. Absent a high degree of credibility, any attempt to provide extended nuclear deterrence to Arab partners is unlikely to succeed over the long term, particularly if the United States continues to dismantle its much smaller nuclear arsenal. There has also been a lack of realism, or at least diplomacy based on realism, in Obama administration dealings in the Middle East, with blowback from a premature and undifferentiated embrace of the "Arab Spring," even as it brought down some friends and trusted allies of the United States.

In 2009, Secretary of State Clinton stated the United States would consider extending a "defense umbrella" over the Middle East if Iran refused to stop the work that could lead to an Iranian nuclear weapon.[10] At that time, Washington acknowledged that no senior official had ever publically discussed it. Secretary Clinton later clarified her comment when she said her warning did not represent any backing away from the Obama administration's position that Iran would not get a nuclear weapon. The fact is that currently, "The United States does not officially extend nuclear assurances to any state within the region." [11] The USG is in a very precarious policy conundrum, because any official discussion regarding offering a "nuclear umbrella" to the Middle East would be viewed politically as an admission of current USG policy failure. Meanwhile, Saudi Arabia has been clear regarding its nuclear intentions. In 2011, Prince Turki al-Faisal, a member of the Saudi royal family and a former Saudi intelligence chief and ambassador to Washington, said, "We cannot live in a situation where Iran has nuclear weapons and we don't. It's as simple as that…. If Iran develops a nuclear weapon, that will be unacceptable to us and we will have to follow suit."[12] These warnings and indicators have been consistent and clear.

Will Assurance Work in the Middle East?

> "…deterrence lies in the mind of the deteree, not the deterrer. To be effective, threatened force has to be credible to the enemy – i.e., the enemy has to believe that you have both the capacity and the will to do what you threaten to do, and that what you threaten to do is unacceptable."[13]
>
> **Jeffrey Record**

Assurance Is All About Credibility

Much like deterrence, the idea of assurance or extended deterrence lies in the mind of the friend or ally being assured, not in the mind of the one providing the assurance. There are many factors which could complicate USG attempts to offer nuclear assurance to friendly Arab nations in the Middle East. American credibility and perceived USG willingness to act if a friendly nation is attacked by Iran are two crucial elements required for assurance to work. NATO countries desired an American nuclear presence in Europe because it was tangible proof of American intent and willingness to use the weapons in defense of allies. In Europe, nuclear weapons are far more a political symbol of power, resolve, and a tool of statecraft than any other weapon or defensive system. Their presence in Europe is summarized as "an essential political and military link between the European and the North American members of the Alliance."[14] It can be argued that their presence in Germany is primarily because Germany demands that they remain. Their presence, coupled with capability (the plans and aircraft capable of deploying them), along with close diplomatic, political, economic, and security ties, provide requisite American credibility. The NATO alliance has a history that stretches over more than 60 years. The fact that these allies have a formal say in decisions that relate to their security is an important factor in the success of the alliance. This credibility comes from decades of working closely together and was integral to the development of trust. Trust and credibility are the backbone that allows the assurance of NATO allies, and

trust and credibility are required for these nations to believe that the United States would act to defend them, at potential risk to itself. The credibility or trust required to create an assurance strategy and regime with friendly Arab nations does not currently exist in the Middle East.[15]

It can be argued that there is a perceived lack of credibility in American will to defend and retaliate against an Iranian nuclear threat. The argument is that the USG would not risk any part of its homeland to defend an Arab nation, i.e., "trade Chicago for Riyadh," which is similar to an argument that was often heard during the early years of NATO. Many friendly Arab governments – as well as U.S. politicians – question whether the USG would be willing to provide the same kind of assurances to Arab countries that it is willing to provide to NATO countries. This is a problem, and it should be explored quickly to determine if an American extended deterrence regime is even politically possible in the United States and in friendly Arab nations. It is also wrong for the USG to simply assume that Arab partners would accept American extended deterrence over having their own capability. France provides a great example of a nation which chose to have its own capability rather than trust the United States to ensure its own security.

There have been noticeable effects of the perceived distance between Washington and Riyadh. USG strategic decisions regarding Syria and perceived inaction after "redlines" were clearly crossed have left the Saudis questioning American will and resolve.[16] It is clear that the Saudis have started to look at other options to ensure their own security. The hesitancy of the Saudis to trust their security to the United States can been seen in their decision in the late 1980s to clandestinely acquire Chinese CSS-2 intermediate-range ballistic missiles (IRBMs) following a U.S. Congressional decision to not support Saudi requests to purchase "advanced weapon systems."[17] Clearly the Saudis' preference is to work with the United States, but if the USG is not willing to understand Saudi redlines or even discuss the level of security that they deem appropriate, any attempt at extended deterrence will likely fail, and they will get a nuclear weapon capability of their own.[18]

What Builds Credibility: Historical Lessons

NATO provides a good case study regarding the importance of "non-strategic" nuclear weapons and the political assurance gained by their presence in Europe. An American nuclear presence in the Middle East might be the only option for the USG if the goal is to limit proliferation and quantifiably signal American assurance and resolve to friendly Arab nations. Others argue that the United States could assure Arab partners under a "defense umbrella" (not necessarily a "nuclear umbrella," as is the case with NATO countries) using its superior conventional and theater missile defense capabilities that would not necessarily imply or guarantee an American nuclear response to an Iranian first use. This view, which suggests that extended deterrence without a willingness to use American nuclear weapons offensively following an Iranian first use, is problematic and would probably not be enough to fully assure partners and stop proliferation. A key finding of an American Enterprise Institute study was: "A credible U.S. offensive deterrent must be 'persistent': that is, dedicated forces must be active, available, and 'present,' at least in the mind of the adversary. In addition, the role of U.S. offensive nuclear forces as the central feature of a 'defense umbrella' covering American allies and their interests across the greater Middle East will be critical. Current policies and plans, however, do not reflect such considerations."[19] There must be clear expression of American willingness to use nuclear weapons in response to Iranian nuclear aggression for credibility to exist and for deterrence to work. So the age-old formula of "capability plus will equals a credible threat" is still relevant and applicable in the case of a nuclear Iran.

Understandably, the idea of the United States offering a nuclear umbrella to friendly Arab nations might be met with some resistance from Israel. Although Israel may have very real concerns, its concerns have to be considered in a broader context of risks from potential proliferation in the Middle East. Unfortunately, there are no good solutions once Iran has a nuclear weapons capability. So the "which is worse" question must be asked. Is a nuclear assurance regime by the United States to friendly Arab nations more unpalatable or the very real potential of individually nuclear-armed Arab states? Given these options, one might imagine that Israel would see individually-armed Arab states as a more risky proposition than

an American assurance regime that sought to prevent Arab proliferation and provided assurances to Arab friends in the region. Israeli perceptions and expectations must be considered when developing any new extended deterrence framework for friendly Arab states. Giving the Israelis an opportunity to discuss their concerns ahead of any regime development will be an important step. It will also be important to engage with them during its development at whatever level is necessary to increase their confidence in American actions and assurances, not only to Israel but to Arab friends as well.

The NATO extended deterrence lessons can help guide any extended deterrence regime in the Middle East. According to unclassified Internet articles, there are five NATO nations including Belgium, Germany, Turkey, the Netherlands, and Italy which possess U.S. "non-strategic" B-61 nuclear bombs capable of delivery by dual-capable aircraft (DCA) from each country.[20] The reason for their presence is best captured in a statement in NATO's Strategic Concept:

> *A credible Alliance nuclear posture and the demonstration of Alliance solidarity…continue to require widespread participation by European Allies involved in collective defence planning in nuclear roles, in peacetime basing of nuclear forces on their territory and in command, control and consultation arrangements. Nuclear forces based in Europe and committed to NATO provide an essential political and military link between the European and the North American members of the Alliance. The Alliance will therefore maintain adequate nuclear forces in Europe.*[21]

The presence of American nuclear weapons in Europe is almost entirely political, because the idea of assurance is in the mind of the ally or partner being assured. As recently as 4 December 2013, Representative Duncan Hunter, who is a member of the U.S. House Armed Services Committee, essentially advocated for a strike on Iran's nuclear weapons capabilities using "…tactical nuclear devices and you set them back a decade or two or three."[22] While the wisdom or utility of a preemptive strike on Iran is debatable, it would appear that the relevance of American tactical nuclear weapons is clear. His statement would imply that there would need to be a "presence" of an American tactical nuclear weapons capability in the

region to accomplish an attack either preemptively or following an Iranian nuclear attack.

Applicable NATO Lessons

There are numerous NATO lessons that should be applied to any attempt to create an extended deterrence regime in the Middle East. In his work, Richard Kugler identified five conclusions which were applicable to an extended deterrence regime design useful in countering a nuclear-armed Iran. His conclusions were:

1. Deterrence does not come easily: it must be carefully planned and executed.
2. An extended deterrence regime for the Middle East must be credible – in the eyes of Iran, the United States, and the countries to be protected by the regime.
3. Close diplomatic cooperation is required among the United States and its friends and allies that belong to the regime.
4. An extended deterrence regime must be provided the political-military power and other instruments needed to achieve its core security goals.
5. Deterrence should be accompanied by a diplomacy of engagement aimed at lessening tensions and dangers in relation to Iran.[23]

Mr. Kugler concludes his paper by saying, "…the idea of creating an extended deterrence regime in the Middle East is a formidable undertaking, but if Iran acquires nuclear missiles, the United States may have little alternative but to pursue some version of a deterrence regime…. Although such regimes have long track records of success in Europe and Asia, there is no guarantee of comparable success in the Middle East."[24] Clearly, the time to start performing this deterrence and assurance work was several years ago. Because of the difficulty involved in building deterrence and assurance and the requirements for "a complex, well-tailored and multifaceted edifice with firm political foundations… a strong superstructure composed of U.S. political leadership, military forces, and

other instruments," [25] the USG is behind in efforts to establish the groundwork for such an extended deterrence regime.

The relationships between the United States and NATO allies were developed over time and were the result of a great deal of cooperation and negotiations. The close political cooperation was developed as both the USG and NATO allies accumulated the shared experiences necessary to solidify the trust that was essential for extended deterrence to work and stop proliferation. The relationships and trust among these nations were essential ingredients. Trust had to be slowly built. NATO Europeans also questioned whether the USG could be counted upon to act if the Soviets attacked. A great deal of negotiation and bargaining had to take place "to create the mutual obligations that made extended deterrence an acceptable proposition on both sides of the Atlantic."[26] It is likely that the Saudis (and others) are looking for more explicit and public security guarantees from the United States.[27] Without extensive effort to understand the security concerns of U.S. partners and a clear communication of American policy that accounts for those security concerns, attempts at offering extended deterrence may be unsuccessful. It is difficult to build these deterrence regimes, but it is probably just as difficult to maintain these agreements after having reached them.

In Colonel William Eldridge's research titled "The Credibility of America's Extended Nuclear Deterrent: The Case for the Republic of Turkey," he concluded that the most important factor for ensuring the credibility of the U.S. extended nuclear deterrent was "the strength of the U.S.-Turkish political-security relationship."[28] He went on to say, "…U.S. credibility depends on Turkey's perception of its political, economic, and military ties with the United States. It is the quality of that broader relationship that will also have the greatest influence on whether or not Turkish leaders pursue an independent nuclear weapons capability." [29] Again, the credibility of the United States depends on many factors, but among the most important are relationships (diplomatic, political, economic, security), cooperation, trust, leadership, and the American nuclear presence in Turkey.

The USG would likely not want to deploy nuclear weapons in the Middle East, because the financial and political costs of such an action could be high. The alternative may be even less appealing: nuclear proliferation in the Middle East. What else would clearly or sufficiently

demonstrate American resolve and trustworthiness of security assurances? Even if the United States did decide to offer some type of "dual key" arrangement with the B-61 bomb and DCA with these partners, this in itself may not be enough to sufficiently assure them in the light of an Iranian missile threat. So, what is required by the Saudis (and others)? "Strong U.S. commitment to the survival of the Saudi regime and the country's territorial integrity will continue to be the best guarantee that the kingdom will not seek nuclear weapons."[30] Additionally, these partners would likely want a capability that is at least equal to or better than Iran regarding weapon delivery timelines. The U.S. nuclear triad is very capable of holding targets at risk and providing proof of capability to these partners. But the triad is not credible absent political will and policies that reinforce USG resolve to defend these partners.

U.S. Capabilities Are Sufficient…But Is American Will?

> "…our nuclear umbrella, our extended deterrent, underpins our alliances in Europe and in the Pacific and enables our friends, especially those worried about Tehran and Pyongyang, to continue to rely on our nuclear deterrent rather than to develop their own."
>
> **U.S. Secretary of Defense Robert Gates, October 28, 2008**

Along with political will, capability is the other essential ingredient required for assurance to work. The American nuclear triad is capable of holding any target in the world at risk. The capabilities offered by U.S. global strike weapons are unique. The lightning fast, thirty-minute timeline from launch to target of American ICBMs, the survivability of U.S. Navy nuclear submarines, and the flexibility and signaling strengths of the U.S. bomber force provide overlapping and complementary capabilities. These capabilities have successfully provided deterrence and extended deterrence for over 60 years. The issue with assurance of Middle

East partners is not that they question American global strike capabilities that have been demonstrated and proven, but rather their questions regarding American "political will" to defend them if and when the time comes. American partners and allies likely have concerns about the USG march to fewer and fewer nuclear weapons, which has likely had some effect on USG credibility as well. Although the wisdom of USG policy decisions to take (as a senior USAF general officer noted) a "20 year procurement and intellectual holiday" regarding nuclear weapon production, design, and industrial infrastructure support is debatable, it is also a likely factor affecting American credibility in the eyes of its allies and partners.

American assurance policy must illustrate genuine USG will to protect Arab partners. There is currently no treaty agreement, as in NATO, where the United States is bound by treaty to defend them, at potential risk to the American homeland. So, the U.S. nuclear triad may be perfectly "capable," but it would fail to assure these partners unless American policy and clearly-communicated intent to utilize the capability in defense of these partners exist. Clear American action would have to reinforce the USG messages. The triad and USAF non-strategic nuclear airpower provide unique capabilities that are necessary to deter Iran, but that deterrence is also dependent on clear American policy demonstrating USG political will. The USAF could play a key role in providing credibility of American nuclear capabilities and demonstration of that capability, commitment, and will to protect partner Arab nations, assuming a clear U.S. declaratory policy is communicated. The presence of American non-strategic nuclear weapons and airpower in the Middle East or demonstrated through current global strike capabilities can reinforce ongoing diplomatic efforts, deter Iran, and assure regional Arab partner states so they do not proliferate. If American attempts to convince or assure them fail, the likelihood of proliferation will rise exponentially. Additionally, the deterrence and assurance value that nuclear weapons offer is lost if the United States is first, unwilling to threaten their use (through clear communication and declaratory policy), or second, actually be willing to use them in response to an Iranian attack. Deterrence of Iran and assurance of partners could fail without both of these.

It is easy to point to examples like the Korean peninsula where there is no American nuclear presence, and yet assurance of both the

Republic of Korea (ROK) and Japan is achieved without it. But one can hardly say that there is a lack of visible and enduring actions that prove American commitment in that region. The numbers of U.S. conventional forces stationed in both the ROK and Japan and the bilateral defense agreements, joint commands, and number and frequency of joint exercises help the development of credibility of American nuclear assurance in that region. In March 2013, the United States flew two B-2 bombers on a 13,000 mile round trip "extended deterrence" mission as part of the joint U.S.–ROK Exercise FOAL EAGLE that was widely covered on virtually all worldwide major news networks. American military press reports also publically acknowledged the presence of a U.S. nuclear attack submarine as well. These types of joint exercises incorporate American strategic forces and boost U.S. extended deterrence credibility and help remove any underlying doubts about American will that allies and partners may have. The bilateral defense agreements and the level of joint exercises seen in NATO and in South Korea send clear messages, but these levels do not exist in the Middle East. The future of U.S.–Egyptian military cooperation is especially problematic in this regard, given the turn of events over the past few years. Furthermore, given the drawdown of American forces and the end of operations in Iraq and Afghanistan, the idea of deterrence by American conventional forces (absent a nuclear threat) could easily be interpreted by partner nations and the Iranians as a less credible "conventional" deterrence than was previously held. So, where are the examples of strategic partnership with friends in the Middle East similar to those in NATO or in Korea? Joint strategic exercises demonstrate American will and capability. More joint strategic exercises and partnership are required with these nations if proliferation is to be halted.

Conclusion and Recommendations

In 2010, President Obama warned, "the greatest threat to U.S. and global security is no longer a nuclear exchange between nations, but nuclear terrorism by violent extremists and nuclear proliferation to an increasing number of states…. For the first time, preventing nuclear proliferation and nuclear terrorism is now at the top of America's nuclear agenda."[31] To achieve this goal, improving American credibility is the first

and most time-sensitive issue that must be addressed. Without correcting the low perceptions of American credibility, any offer of extended deterrence might not be trusted and therefore not taken. Without a credible and well-thought-out USG Middle East extended deterrence strategy and regime, nuclear proliferation will occur. The United States is behind on developing this regime.

In order to prevent a further deterioration of American influence and credibility in the region, effectively deter a near-nuclear Iran, and assure Arab partners of American commitment, the United States should undertake six efforts:

1. Develop an interest-based strategy for the Middle East that ensures stability and enhances the balance of power between friendly Arab nations against a still unfriendly and aggressive Iran. Working collaboratively with Arab partners will improve American credibility in the eyes of Arab partners as well as Iran. If an extended deterrence regime is to succeed, it must be carefully planned and executed.[32]
2. Maintain sanctions against Iran while also establishing clear milestones that must be met before any sanctions are eased. This would also require giving Arab partners' concerns clear consideration regarding any potential removal or easing of international sanctions.
3. Undertake a more effective effort to understand the concerns of Arab partners. There is a real possibility of alienating friendly governments. Many partner nations have supported U.S. policy objectives in the Middle East for decades and deserve to have their concerns heard. This includes Israel, which is often in disagreement with the objectives and priorities of Middle Eastern Arab partners or potential U.S. partners.
4. Develop and enhance regional security arrangements that include joint strategic exercises and cooperation between Arab partner nations, intelligence activities, and joint strategic military demonstration exercises. These are

necessary to not only deter a near-nuclear Iran, but to ensure partner Arab nations.

5. Publically engage the Saudis and other friendly Arab nations for the purpose of determining their strategic redlines. Preventing the spread of nuclear weapons in the Middle East is possible, but will require deft diplomacy and security agreements.

6. Either extend the nuclear umbrella to these partners or allow them to develop, borrow, or purchase their own nuclear capabilities. Recognize that the Saudis are already looking to other nations to help them ensure their own security in the event Iran declares itself a nuclear armed state. It is extremely unlikely that they will simply do nothing to address their own very real concerns.

Unfortunately, the United States is at times in a "no win" situation in which conflicting priorities require marginal trade-offs between seemingly pro-Israel and pro-Arab policies. Reassurance of the Saudis is important, given their clear warnings and intent if Iran takes the final step toward a nuclear weapon capability. Their proximity to Iran and their regional power make them the closest counterbalance to Iran in the Persian Gulf region. The United States has lost considerable ground there. There is insufficient clarity in USG policy about what the USG will do if the Iranians get a "turnkey" nuclear weapon capability in which they accumulate sufficient amounts of fuel and supporting technology to bring them within months of weaponizing and then stop.

Finally, the U.S. Air Force's nuclear enterprise will play a critical role in providing options and capabilities necessary to deter Iran and assure partners. However, absent USG political will and clear policy aimed at defending these partners, the deterrent value may be lessened or lost. The United States is likely at a point where it will have to offer extended deterrence to these partners, and the only way to stop proliferation in the Middle East will be these partners trust the USG to uphold promises made to them. If the United States chooses not to offer extended deterrence, then it must be willing to accept proliferation in the Middle East.

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CHAPTER 3

Modernizing the Nuclear Bomber Force: A National Security Imperative

Thomas C. Kirkham

The Cold War officially ended over twenty years ago. For many people, this meant they were finally free from the fear of nuclear war; the nuclear weapons and delivery systems that had protected them now seemed unnecessary. This belief is reflected in the U.S. nuclear program, as it has fallen into a state of decay since the end of the Cold War. In effect, the United States has taken a "procurement holiday" for the past twenty years and has failed to modernize its nuclear arsenal. Instead, the United States has chosen to extend the lifespan of its nuclear weapons and delivery platforms rather than following forty years of precedent and building new ones. The same cannot be said for other nuclear powers. In fact, it is quite the contrary: nuclear powers such as Russia and China continue to modernize their nuclear arsenals and the list of nations striving for their own nuclear weapons programs continues to grow. The emergence of North Korea's nuclear capability and the impending advancement of Iran onto the nuclear scene clearly demonstrate that the Cold War may be over, but nuclear weapons still play an integral role in national security. The United States must recognize that as long as other nations place great value in their nuclear weapons programs, it must do the same.

As the strategic bomber force continues to age, it will eventually no longer serve as a credible deterrent. Failure to modernize the nuclear bomber fleet weakens America's long-term deterrent and may even lead to greater nuclear proliferation as allies no longer feel protected by American extended deterrence, leading them to develop nuclear programs of their

own. For these and other reasons, strategic bombers remain as relevant today as they were at the height of the Cold War and continue to play a vital role in the security of the United States and the nation's allies. In short, the United States must modernize its strategic bomber force in order to increase the nation's flexible response deterrent and ensure the nation's security. Only then will the country be in a position to address both current and future nuclear threats.

History

Strategic nuclear bombers have played an integral role in the defense of the United States for over sixty years. These long-range aircraft can produce tailored effects on a myriad of targets anywhere on the globe within a few hours. The need to sustain such a fleet is dictated not only by the role the United States has assumed as guarantor of global security but also by geographic reality: the United States is separated from its adversaries by vast oceans.[1] Bombers initially entered the scene during World War I. The United States steadily developed more advanced bombers over the course of the next eighty years. However, after the collapse of the Soviet Union, the United States ceased spending money on new long-range strike aircraft. Because new, emerging enemies like al Qaeda lacked air forces and air defenses, bomber modernization was not regarded as a high priority: money that would have been spent during the Cold War to keep long-range strike capabilities robust went elsewhere.

Instead, the U.S. Air Force elected to upgrade its current fleet of bombers by introducing smart weapons, secure data links, and advanced avionics. However, it has not developed a new bomber in twenty years. To underscore the point, in 1960, the U.S. Air Force had 1,515 bombers in its inventory.[2] Today, the Air Force has only 96 nuclear capable bombers in service, and the average age of the strategic bomber fleet is just over 33 years old.[3] The fact that the newest B-52s still in service rolled off the assembly line over 50 years ago (1962) is unprecedented in American military history. As threats change, it is not clear that what is left of the heavy bomber force can cope with the military challenges that lie ahead. For instance, China is investing heavily in anti-access and area-denial capabilities aimed at keeping U.S. military forces out of its region. If the United States is going to counter these challenges in the Pacific, which is

quickly becoming central to the new global economy, it must modernize its strategic bomber force.[4]

Attributes

If recent experience is any guide to the future, the timing and locations of international crises will prove extremely difficult to predict. This means that the mobility strategic bombers provide ensures the President has flexible options, far exceeding those of either ICBMs or SSBNs, which make up the other two legs of the nuclear triad.

Strategic bombers can carry a wide variety of weapons, from conventional to nuclear and from traditional gravity bombs to long-range standoff weapons like air-launched cruise missiles (ALCMs). Also important is the fact that strategic bombers carry the only variable-yield nuclear weapon, which means the President can use a low-yield nuclear weapon instead of being constrained by the large yields of ICBMs or SLBMs. Additionally, bombers eliminate the need to overfly Russia or China (should the target be elsewhere), and they are the only recallable delivery platforms.

To the extent that an attack against an adversary is a function of politics, the military tools employed to support it must be responsive to the President and his need for flexible attack options. Strategic bombers can fly airborne alert, ready to proceed to any target at a moment's notice, or deploy forward as a coercive measure as the President seeks to deescalate a conflict. Although SSBNs and ICBMs are also responsive, their application in a crisis is very limited and offers the President very few options in an escalation/de-escalation scenario.

Given the bombers' ability to cover great distances quickly, free of the obstructions of surface terrain, the only real challenges they face are anti-aircraft defenses, which have yet to detect the United States' stealth bombers. Because bombers are mobile and can carry a wide array of weapons, an adversary's ability to plan a defense against American bombers is exceedingly difficult.

Should the United States learn that an adversary has deployed its anti-aircraft forces in just the right place to defend against incoming bombers, the mission can be changed and weapons can be reprogrammed in mid-flight as attacking bombers fly around the threat. The same cannot

be said of either ICBMs or SLBMs. They simply do not have the flexibility or responsiveness of the bomber force. Their strengths lie in providing a second strike capability and survivability, both of which are complimentary, not redundant to the bomber leg of the triad.

The final characteristic of the bomber force that makes it the nation's single best nuclear weapons delivery platform is its ability to signal adversaries of American intent. For deterrence to be effective, it is imperative that a nation be able to send a clear message to the country that is about to be on the receiving end of an American attack. Nothing demonstrates American resolve better than putting fully loaded strategic bombers on alert or deploying them to a forward base as the spy satellites of a target nation pass overhead. The ability to signal in a nuclear crisis is a characteristic found only in the bomber force.[5]

By their very nature, SSBNs and ICBMs are designed to be stealthy and hidden from view. Consequently, their utility in an escalation/de-escalation scenario is extremely limited.[6] In fact, the range of missions in which either could be employed and the types of attacks and weapons effects they could create are very limited. Although flushing submarines from port or increasing the alert posture of the ICBM force could signal American concern during a crisis, little more can be done with these weapons systems to send a clear message to an adversary.

In terms of signaling, strategic bombers also enhance the effectiveness of coercive threats. Absent the ability to clearly communicate both the will and the capability to carry out an attack, coercion does not work. [7] Therefore, to be an effective tool in crisis management, strike assets need to be employable in ways that visibly communicate one's capability, resolve, and restraint. Only nuclear-capable bombers can effectively perform this function.

Critics' Arguments

According to critics of strategic nuclear bombers, the circumstances in which the United States might employ them are rare and rapidly diminishing. With this in mind, and in light of a dwindling DOD budget, many argue that the bomber leg of the nuclear triad should be eliminated. In the minds of detractors, bombers are overkill and the costs associated with maintaining nuclear capable bombers are no longer

justifiable.[8] In fact, many critics believe that the United States should focus on a dyad of ICBMs and SSBNs to counter current nuclear threats. There are many reasons why detractors believe strategic nuclear bombers are no longer viable delivery platforms, but these reasons can be summarized in two primary categories. First, critics argue that nuclear capable bombers have a destabilizing effect on security. Second, critics argue that bombers inherently possess several negative attributes that impede their effectiveness as nuclear deterrence weapon systems.

The first argument – bombers are destabilizing – is based on the fact that bombers are the least secure leg of the nuclear triad. By their very nature, bombers operate from airfields where nuclear weapons have to be transported from secure weapons storage areas to the flight line for loading. During convoy and upload operations, nuclear weapons are more vulnerable to attack, because they are in the open and are no longer protected by hardened storage facilities. In fact, this vulnerability remains until the loaded aircraft becomes airborne. Even then, however, nuclear-loaded aircraft are still vulnerable to accidents due to mechanical failure, extreme weather, or human error. Conversely, ICBMs and SSBNs are much more secure. ICBMs are housed in hardened silos until launch and SSBNs are only vulnerable while in port; otherwise they remain invisible under the protection of deep ocean waters that are distant from population centers.

The second argument offered by detractors is based on the fact that bombers, by virtue of their sheer size and slowness, are vulnerable to enemy air defenses. To combat this vulnerability, the Air Force first outfitted nuclear-capable bombers with cruise missiles. The ability to launch nuclear weapons outside the range of enemy air defenses certainly made bombers much more viable as a nuclear deterrent, but it also introduced the problem of overflight. Launching missiles over sovereign airspace significantly increases the risk calculus of executing an offensive strike. On one hand, asking permission from a country to overfly their airspace can result in a denial or, if approved, can result in a loss of surprise due to leaked information. On the other hand, if the decision is made to launch without the permission of an affected nation and the missile is either detected by their defenses or goes off course and crashes in their territory, an embarrassing or potentially hostile international incident could occur. Critics point out that if air-launched missile

overflight is necessary, then bombers provide little that cannot be accomplished with ICBMs or SLBMs.[9]

The second approach taken by the Air Force to reduce strategic bombers' vulnerability to enemy air defenses was the development of stealth technology. The introduction of the B-2A stealth bomber was a game changer that currently enables the United States to penetrate even the most sophisticated enemy air defenses. However, critics argue that stealth technology has escalated tensions between near-peer competitors due to the increase in threat, destabilizing the international security environment. Critics also point out that the high cost of stealth bombers ensured they are no longer a cost-effective nuclear delivery platform—a key argument made by proponents of maintaining the bomber leg of the triad. In fact, critics point out that the Air Force plans to buy 80 to 100 "next generation" stealth bombers at a cost of $550 million each with a total program cost estimated between $40 and $60 billion.[10] Even Air Force leaders acknowledge that the high cost of the new bomber could lead to its curtailment or cancellation. Current plans also call for upgrading the warhead on the new bomber's air-launched cruise missile and giving the B-2A stealth bomber the capability to launch it. But, as previously mentioned, critics believe this is a niche that can easily be filled by ICBMs or SSBNs.

Aside from bombers' destabilizing effects, critics also argue that they possess several additional negative attributes. The first of these is that bombers provide only a minimal second-strike capability. The nuclear triad was developed during the Eisenhower administration as a result of competition between the Soviet Union and the United States. The primary rationale that drove the development of the nuclear triad was to assure the American public of a second-strike capability in the event of a Soviet preemptive attack. A diversification of delivery platforms would complicate targeting for the Soviet Union, thus ensuring the survival of the nuclear arsenal. However, strategic bombers offer only a minimal second-strike capability, and to achieve that, bombers must be placed on alert status so they can be launched prior to inbound missile impact. The limited second-strike capability, combined with the fact that bombers primarily employ weapons in the kiloton range, not megaton range, means that having the capacity to completely destroy a peer nuclear power is highly unlikely.

Another negative attribute pointed out by detractors is that bombers are highly susceptible to surprise attack while on the ground. Today, nuclear capable bombers are few in number – less than 100 – and they are stationed at only three bases in the United States. This makes them vulnerable to surprise attack. Critics argue that when bombers are forward-deployed to overseas contingency bases, this vulnerability is increased even further. They suggest that this vulnerability to attack while on the ground not only diminishes the deterrent value of bombers, but may even invite attack—another reason to eliminate the bomber leg of the triad.

Furthermore, bomber critics argue that American conventional power makes the case for maintaining the nuclear triad exceptionally dubious. Detractors point out that no adversary of the United States likely possesses the capability to destroy the ballistic missile submarine force and ICBM force, making the bomber leg unnecessary. This argument suggests that nuclear weapons, for all practical purposes, are essentially irrelevant in today's wars, which are primarily fought against non-state actors and weak states that do not have nuclear arsenals.[11] This makes a nuclear-capable bomber unneeded in today's wars.

Critics do recognize that nuclear weapons play a role in war scenarios with other nuclear-armed powers. However, cases where the success of deterrence hinges on the United States' ability to destroy enemy nuclear forces are few and far between. This suggests that the few remaining situations in which the use of nuclear weapons may be required could easily be handled by ICBMs, SSBNs, or conventional forces, and it does not justify the need for strategic nuclear bombers.

In the minds of many detractors, it is clear that nuclear weapons have grown less important to American national security due to the nation's overwhelming conventional military superiority. They are also quick to point out that fewer states have revisionist territorial aspirations, much less the capability to act on them. Therefore, nuclear threats are not credible, and nuclear weapons are unusable in the vast majority of real and imagined military contingencies. In the detractors' opinion, these factors explain why spending on nuclear weapons by the Pentagon has fallen from almost 27 percent of the defense budget in 1961 to 4-6 percent today.[12] Justifiably then, since less is asked of nuclear deterrence, it demands fewer

delivery platforms—with ICBMs and SSBNs more than adequate to address current and future needs.

Lastly, critics believe the most basic flaw in building a case for maintaining the triad – to provide a counterforce capability – is that deterrence and extended deterrence can be achieved without it. The theory that extended deterrence requires counterforce capability is a Cold War artifact based largely on misperception of the Soviet threat.[13] Critics point to evidence that suggests European peace would have held firm without American counterforce threats. Both sides saw a reasonable chance of destruction as too risky for engaging in offensive maneuvers.

Even today, critics argue that neither China nor Russia seems greatly concerned by American counterforce capabilities. These critics believe that China and Russia view even somewhat-vulnerable arsenals as sufficient to deter attack. From their viewpoint, scenarios where countervalue threats fail to deter attacks on allies, but counterforce threats succeed, are becoming difficult to imagine. With this in mind, critics argue that the United States needs to adopt a countervalue targeting strategy, thus eliminating the need for maintaining a nuclear triad. In their opinion, maintaining the bomber leg of the nuclear triad in today's threat environment is nothing more than overkill and a waste of taxpayer dollars.

Supporters' Arguments

Supporters of maintaining the bomber leg of the triad insist that the responsiveness and flexibility of strategic bombers provide a stabilizing effect on international security. They argue that the flexibility of bombers lends capability and credibility to deterrence, the capstone of American foreign policy. Deterrence, which is the prevention of action by fear of consequences, is a state of mind brought about by the existence of a credible threat of unacceptable counteraction. [14] Deterrence strategy is intended to dissuade an adversary from undertaking an action not yet started or to prevent them from taking something another state desires.[15] In order for deterrence to be effective, a nation not only must have the capability to punish an adversary but must also have the will to carry out an attack. To achieve effective deterrence, the United States must have the capability and, most importantly, the credibility to create the desired effect.[16] The flexibility and responsiveness inherent in strategic bombers

exemplify these characteristics, making deterrence more likely to achieve the desired effects. Given that there is no margin for error in nuclear deterrence, sending the wrong signal is unacceptable.

While critics assert that deterrence is only effective against other nuclear-armed states and does not apply to today's wars against non-state actors, a case can be made that, in fact, non-state actors can be deterred. Looking at the kinetic effects pyramid may be the best method for understanding how non-state actors could be deterred, the highest level of the pyramid being nuclear conflict and the lowest being terrorism. Non-state actors undoubtedly would prefer to operate at the highest possible level but are pushed to the bottom of the pyramid because they lack resources and are weak. The lower an actor is on the pyramid, the harder it is for him to change the status quo. According to Mao Zedong, every terrorist/insurgent aspires to move up the pyramid until he is strong enough to defeat his adversary in a conventional conflict.[17]

According to this logic, it is possible to develop an understanding of non-state actors – the most pressing threat the United States faces today – that attaches rationality to their behavior. If an adversary is considered rational, he can be deterred. And, as with states, the success of deterrence depends on determining what the non-state actor values, holding it at risk (capability), and effectively communicating a threat to the non-state actor (credibility).[18] The capability and credibility strategic bombers bring to the table make this possible and, therefore, have a stabilizing effect on international security.

Strategic bombers are also immensely useful in escalation/de-escalation during a conflict.[19] ICBMs and SSBNs do not have the ability to demonstrate resolve, another characteristic that has a stabilizing effect on security. Bombers are capable of sending powerful signals to adversaries and allies alike. Governments notice their presence on Guam or other forward-deployed locations. They are also keenly aware when bombers appear over places like South Korea or, more recently, when B-52s penetrated China's newly-proclaimed air defense identification zone (ADIZ) located in the East China Sea. Although critics claim that bombers are no longer relevant, events such as these always make front-page news, suggesting quite the contrary.

Because bombers are recallable, "scrambling" them toward a potential target is a highly visible way of demonstrating resolve to

adversaries and allies without actually launching a nuclear weapon. In a crisis situation, this would enable the cancellation of a bomber strike force after it had been ordered if new information emerged or the President changed his mind. [20] Such a demonstration of resolve might deter a potential adversary and thus prevent war. Land- and sea-based missiles offer no analogous capability. The ability of the United States to signal its intentions and resolve singularly hinges upon maintaining the strategic bomber leg of the triad.

Aside from strategic bombers' stabilizing effects on security, they also possess many positive attributes that make them stalwarts of the nuclear triad. Bombers can be dispersed from their bases quickly in order to survive a nuclear first strike.[21] Thus, the President would not feel the pressure to "use or lose" bombers during a crisis. Such pressure might exist with immobile land-based missiles, which are more vulnerable. American bombers can also carry nuclear weapons with the lowest yield, which means that nuclear-capable bombers could potentially provide the President with less devastating options when launching a nuclear attack.[22] This capability would prove extremely valuable if the need arose to strike a non-state actor or engage in a limited strike.

Bombers also minimize the need to overfly Russia and China if the targets are elsewhere. Trying to assure either country that U.S. missiles flying towards them were not meant for them would be difficult at best and would certainly prove destabilizing. Bombers also offer an alternative to missiles in assuring strategic penetration. If a nuclear force were entirely deployed on missiles, that force might be neutralized by an adversary's deployment of a workable missile defense system.[23] Bombers can stage from bases worldwide, holding any target on the globe at risk, and they can attack from various directions and altitudes. These attributes complicate targeting and the defense plans of potential adversaries.

Finally, like no other leg of the nuclear triad, bombers are dual-capable. They can be loaded with a myriad of conventional or nuclear weapons. This makes them extremely versatile in conducting a range of military strike options. This is especially useful in conflict escalation/de-escalation scenarios. Initially, the President can order the use of conventional weapons. However, if the situation escalates and the need arises for a nuclear option, he can increase the deterrence posture of the nation by ordering bombers to be armed with nuclear weapons. The ability

of strategic bombers to fill both conventional and nuclear roles not only makes them effective agents of deterrence, it means the United States gets more "bang for the buck," which is crucial in the current fiscal environment.

According to Major General Garrett Harencak, the Deputy Chief of Staff of the Air Force for Strategic Deterrence and Nuclear Integration, operating the current triad costs Americans less than they spend on going to the movies every year—only 2 percent of the military budget, or about $10 billion annually.[24] As he has stated, "We're not spending a lot of money on it, and what we are spending is certainly a bargain."[25] This is especially true of the costs associated with maintaining the bomber leg of the triad. Major General Harencak also refutes the notion that the U.S. military is in some sort of Cold War hangover, as some critics assert. He stated, "We in no way have anywhere near the infrastructure or even the mindset that we had during the Cold War." [26] The percentage of the defense budget spent on the nuclear enterprise and the number of nuclear weapons and platforms the United States possessed during the height of the Cold War far exceeds that of today, making it an affordable and relevant piece of the nation's defense.

Recommendations

With a limited nuclear arsenal at its disposal, and considering the critical role the nuclear enterprise plays in effective deterrence, the United States must modernize the bomber leg of the triad and the nuclear weapons that bombers employ. The newest platform in the bomber inventory is the B-2, which was initially developed in the late 1980s.[27] B-2s have been in service for over sixteen years now and, although there are only nineteen in the U.S. Air Force, they still play an important role in nuclear deterrence. Armed with the B-61 – a gravity bomb fielded in 1961 – and the newer B-83, the B-2 was designed to deliver weapons over highly-defended targets. Despite its somewhat modern technology, the B-2 has two major limitations: it lacks a nuclear standoff capability, and its high procurement cost limited the number of aircraft produced.

The B-52 comprises the other half of the nuclear-capable bomber fleet. Originally designed in the 1950s, the B-52 is a tribute to its builders and a symbol of decay in the nuclear enterprise. The fact that an aircraft

designed almost 60 years ago still plays a major role in the nuclear arsenal demonstrates the neglect that the arsenal has suffered since the end of the Cold War. During the Cold War, the U.S. Air Force fielded numerous bombers that were designed to replace the B-52, yet none has been able to achieve that goal. Even the B-2 has proven to be too expensive to fully replace the B-52 fleet. Instead, the two are now partners in the delicate task of balancing nuclear and conventional missions. Fortunately, the B-52 was so well designed that it still plays a valuable role in the nuclear deterrence mission.

The future of long-range strike (LRS) for the U.S. Air Force focuses on the concept of a next generation bomber (NGB)—a long-range bomber to may be fielded no sooner than 2018. The NGB is a topic of much interest for the defense industry, DOD, and Congress. Each has published opinions and considerations pertaining to this future aircraft. There is considerable information pertaining to the necessity of a new bomber. The Congressional Research Service publication *Air Force Next Generation Bomber: Background and Issues for Congress* presents detailed discussion between DOD and Congress about the necessity of the NGB. The Senate Armed Services Committee found, "Long Range Strike is a critical mission in which the United States needs to retain a credible and dominant capability."[28] Even so, the prospect of building the NGB is at risk due to declining defense budgets.

The B-61 and B-83 gravity bombs employed by the bomber leg of the triad also require modernization. In 1991, the United States built its last nuclear warhead. [29] Since then, the nuclear stockpile has been refurbished and modified to stay ahead of problems associated with aging, but no new warheads have come. Stephen Younger, a former senior fellow at Los Alamos, concluded that the effect of these Life Extension Programs (LEPs) on warhead reliability is unknown. [30] Yet a recent unclassified portion of a JASON Defense Advisory Group report seems to agree with the "basic scientific approach" to the LEP.[31] Reports on the reliability of nuclear weapons are classified and are therefore outside the realm of this discussion, but former Secretary of Defense Gates has argued, "the information on which we base our annual certification of the stockpile grows increasingly dated and incomplete."[32] The reality is that nuclear weapons are complicated, and it is a tremendous risk to rely on LEPs.

The AGM-86 ALCM, which provides the B-52 with its standoff capability, entered service in the early 1980s and also requires replacement. The U.S. Air Force Life Cycle Management Center Strategic Systems Division (AFLCMC/EBB) is currently conducting market research to identify companies that could participate in the planned long-range standoff (LRSO) cruise missile program. With feedback from industry, the U.S. Air Force is expected to craft an acquisition strategy, which it will then present to the Pentagon for approval. The weapons must be able to penetrate and survive integrated air defense systems from a "significant" standoff range and "prosecute strategic targets in support of the Air Force's global attack capability and strategic deterrence core function," according to the Pentagon's budget justification documents.[33]

The new missile will be designed to be compatible with the B-52H, B-2, and the planned long-range strike bomber (LRS-B). U.S. Air Force budget justification documents show that more than $600 million was requested over the next five years to begin development of the LRSO missile, making it another prime target for cancellation due to the current fiscal environment.

The NGB and LRSO programs are vital to effective deterrence and must be fully funded, even if it means reducing or eliminating other U.S. Air Force acquisition programs. If that were to become necessary, the F-35 program should be considered for reduction. The A-10s and F-16s currently in the inventory are more than capable of filling both close air support and multi-role air-to-ground missions. Additionally, the F-35 program is seven years behind schedule, and the cost per aircraft has nearly doubled from $69M in 2001 to $137M in 2012.[34]

The reason why the United States must modernize its bomber force is simple. Nuclear weapons and their delivery platforms are needed to deter other nations that have nuclear weapons. As long as other nations, allies, or adversaries maintain and continue to build their nuclear weapon capabilities, the United States must continue to build its own.[35] By not modernizing the bomber fleet and associated weapons, the United States could cause other nations to question the credibility of its nuclear arsenal. For deterrence to have any value, there must be a perception, on both sides, that nuclear weapons will be used in certain extreme circumstances and that they will function as designed if called upon to do so.

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CHAPTER 4

ICBMs: Cold War Relics or Products for Peace

Anita A. Feugate Opperman

The United States initially developed its land-based ICBM fleet to increase the credibility of nuclear deterrence during the Cold War. Since the Cold War ended, the threat has changed but persists. Critics, however, contend that ICBMs are no longer relevant in the post-Cold War world environment and, in a fiscally constrained environment, the cost of modernizing the system outweighs any security benefit it provides; thus, retirement of ICBMs is warranted.

Contrary to this view, ICBMs continue to serve as a key contributor to national security and must remain in the arsenal to deter against both current and future threats. This paper begins with a brief background of the ICBM, continues with a synopsis of anti-ICBM arguments, and then examines the ICBM's continued relevance. Finally, the paper concludes with recommendations for ensuring the ICBM fleet remains a viable weapon system for the foreseeable future.[1]

Background

The U.S. Air Force (USAF), through Air Force Global Strike Command (AFGSC), is responsible for operating, maintaining, and securing the nation's ICBM force. ICBMs became part of the U.S. nuclear arsenal in the 1950s with the deployment of the Titan and Atlas missile systems, followed by the first Minuteman system in the 1960s.[2] The Minuteman III, deployed in 1970, is projected to remain in service until at

least 2030.[3] At one time, there were 1,054 ICBMs on alert.[4] Today, the ICBM force consists of 450 Minuteman III on-alert missiles.[5]

ICBMs are located in hardened launch facilities designed to protect against nuclear attack. The launch facilities are dispersed across a total of 31,900 square miles in Colorado, Montana, Nebraska, North Dakota, and Wyoming.[6] Each missile and associated launcher, or silo, is connected to an underground launch control center through a system of hardened and pressurized cables. Launch crews, consisting of two officers each, perform around-the-clock alert in the launch control centers and are ready to respond to a Presidential nuclear launch order at a moment's notice.[7]

ICBMs are Cold War Relics

Because the strategic environment has changed since the Cold War, critics contend that ICBMs are no longer relevant and should be retired. The most vocal ICBM critics cite the destabilizing effect they believe the weapon has on international security as the major reason to remove it from the nuclear arsenal. The anti-ICBM movement suggests the weapons are on hair-trigger alert, which is not only destabilizing but also an accident waiting to happen.[8] They go on to claim that a rapid-response posture allows for the possibility that the United States could launch a nuclear attack based on incomplete information or misinterpretation of data, which is a far greater risk than an "out of the blue" nuclear attack.[9] The Global Zero Commission, a strident critic of the ICBM, states, "Given the end of the Cold War, it makes sense to end the Cold War practice of preparing to fight a large-scale nuclear war on a moment's notice."[10] The popular thought is that Russia, America's only nuclear peer, is no longer a threat, so there is no longer a need to respond rapidly. If there is a nuclear threat, SSBNs and/or bombers will have enough advanced notice to successfully respond.

Another destabilization argument suggests that the existence of ICBMs could force adversaries to attack the U.S. mainland to prevent an American retaliatory strike. Critics charge that ICBMs are a Russian "warhead sponge."[11] Because Moscow (or Beijing) will need to attack American territory to eliminate a large part of the nuclear arsenal, Washington will respond in kind and attack Russia's (or China's) cities, moving toward nuclear annihilation.[12]

Finally, since some ICBMs may not survive a first strike, the President may decide to launch on the warning of an attack instead of waiting to verify an actual attack is occurring.[13] The "use it or lose it" attribute of the ICBM leads to the possibility America may launch a strike before ensuring there is truly a threat. ICBM detractors argue that not only do ICBMs promote greater instability, but other characteristics also make them no longer relevant.

ICBMs were developed as a deterrent against Russia, therefore their optimal post-launch flight path sends them north over the pole and then, in most scenarios, over Russia.[14] If Russia is not the target of a nuclear strike, conventional wisdom suggests the United States would most likely not risk Russia misinterpreting an ICBM overflight as an attack on Russia in an attack against North Korea or Iran. This gives ICBMs little utility against rogue nations if the United States constrains its employment of the weapon to ensure Russia is not inadvertently provoked.

In addition to overflight concerns, detractors argue that ICBMs are not relevant because they cannot de-escalate a nuclear crisis. Due to the size of the weapon and its effects, the ICBM has little utility in a limited nuclear conflict. Again, working from the point of view that the United States' likely adversaries are not peer competitors, the most logical application of nuclear weapons would be several small weapons (most likely delivered from a nuclear bomber) used, as Kenneth Waltz writes, "to produce sobriety in the leaders of all of the countries involved and thus bring rapid de-escalation."[15] Of even more concern for ICBM opponents is that once the missile is launched, there is no way to either retarget it or, more importantly, recall the missile if the adversary responds to the United States' threat and a nuclear attack is no longer justified.[16] Additionally, using ICBMs could worsen an already poor situation. Critics charge that the United States cannot use ICBMs effectively to stabilize a crisis on the verge of erupting or visually assure allies that they are covered by the nuclear umbrella.

A separate criticism of the ICBM force relates to the expense of modernizing the aging fleet. The Minuteman III has been in continuous operation for over 40 years but requires a $5 billion life extension to keep it operational through 2030.[17] An additional obstacle facing the ICBM fleet is the fact that many of the manufacturing processes and techniques used to build Minuteman III missile components are no longer available,

since many of the companies that originally built components are no longer in business.[18] The United States chose to halt testing of nuclear-specific components following President Clinton's signing of the Comprehensive Test Ban Treaty (CTBT) even though the Senate has not ratified the treaty.[19]

ICBM maintenance and modernization costs in conjunction with the United States' budget concerns help bolster detractors' argument that ICBMs are no longer relevant for national and international security. In addition, some would argue that ICBMs are too inflexible, since they cannot serve any role other than that of a nuclear deterrent.[20] This rationale suggests that there is no room for a weapon system that does not have both a nuclear and conventional function.[21]

These arguments against ICBMs' relevancy in the current global environment appear logical and give the impression that the world would become a safer place without them. However, if America were to eliminate the ICBM leg of the triad, the world would be less, not more, secure. In fact, the threat of attack would be greater, and the costs of an alternative (conventional or nuclear) would prove more taxing on the U.S. Treasury.

ICBMs, Products for Peace

The 2012 Defense Strategic Guidance states, "we (the United States) will field nuclear forces that can under any circumstances confront an adversary with the prospect of unacceptable damage both to deter potential adversaries and to assure U.S. allies that they can count on America's security commitments."[22] ICBMs ensure stability and balance in national and global security because they guarantee an adversary cannot deliver a preemptive strike without all but depleting their entire arsenal, while the United States is still able to deliver a retaliatory strike.[23]

Before turning to the specific attributes which make the ICBM such a stabilizing force, one must understand why the ICBM is a relevant weapon system across the spectrum of threats in the post-Cold War environment. The United States, with its unique global responsibilities, must be prepared to counter traditional threats (Russia), emerging threats (China), rogue nations, and nuclear aspirants. Of note, as illustrated in Figure 1, the United States and United Kingdom are the only nuclear

countries not currently modernizing or developing new nuclear weapons or delivery platforms.

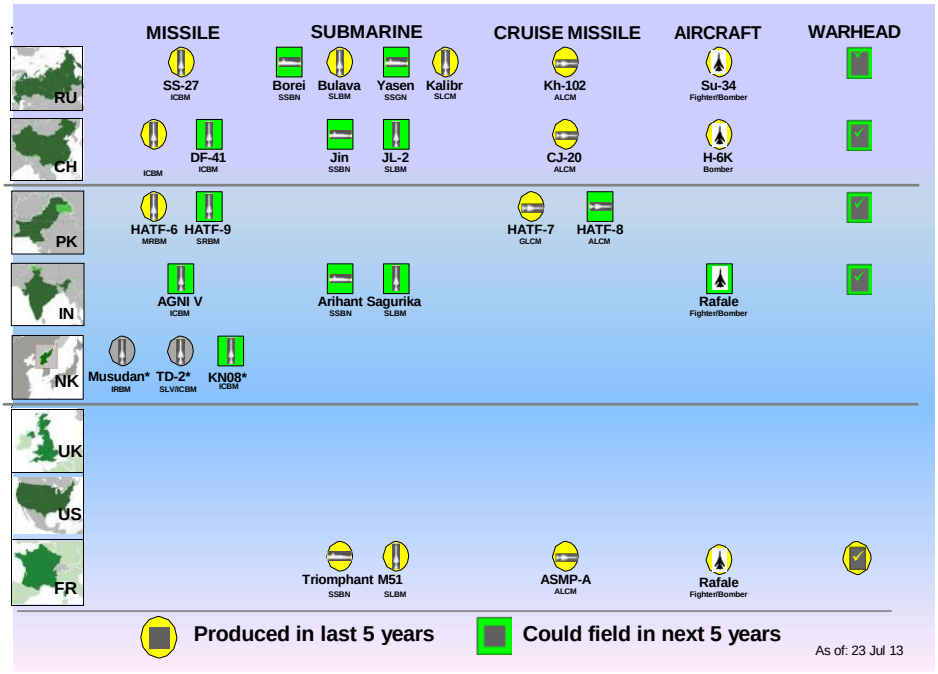

Figure 1: Status of Nuclear Countries' Weapon and Delivery Platform Modernization[24]

First, although America has collaborated with Russia on reducing the size of each country's nuclear arsenal, Russia still views a nuclear arsenal, specifically ICBMs, as central to national security strategy.[25] This is in part because of an inferior conventional force that requires Russia to rely on ICBMs and SLBMs to defend the nation. [26] Russia's nuclear doctrine has a clear first use of nuclear weapons policy to protect the security of the country even if it is engaged in conventional warfare.[27] In addition, Russia views nuclear weapons as a "guarantee of independent foreign policy and a means of deterrence of ideological competitors."[28] Nuclear weapons continue to be the cornerstone of Russian war fighting. Russia is not afraid to use threats of a nuclear attack to pressure its neighbors to comply with demands, such as keeping U.S. missile defense systems out of Poland or stopping Ukraine from joining NATO.[29,30,31]

Furthermore, Russia has been actively working to modernize its ICBM infrastructure, to include a new heavy ICBM capable of carrying up to 15 warheads each, clearly signaling the Russian government does not plan to remove ICBMs from its arsenal.[32] As former Secretary of Defense Harold Brown observed regarding the U.S. and Soviet nuclear arsenals in the 1970s, "We build, they build, we stop, they build."[33] This continues to be the case today.

Next, China is a potential nuclear threat to both the United States and its allies. Although China does not have as many weapons as Russia, the country has "the most active land-based ballistic and cruise missile program in the world."[34] Far less is known about China's nuclear program than Russia's; however, some experts estimate that the Chinese may continue to grow the size of their nuclear arsenal in response to India. These weapons are a threat to the United States, because this growth could double the number of warheads capable of striking the United States by 2025.[35] In addition, although China has a no-first-use of nuclear weapons policy, Chinese generals have used the threat of nuclear war over Taiwan. [36] China, like Russia, is aggressively modernizing its nuclear capabilities, to include developing new ICBMs capable of carrying multiple warheads.[37] With a rising number of nuclear missiles, China will become a nuclear peer of the United States as the U.S. arsenal declines.

North Korea is also actively building nuclear weapons and improving delivery platforms, placing the program on equal footing with the country's economic development.[38] Although it may be years before North Korea has proven capability to deliver nuclear weapons, North Korean leader Kim Jong-un, is already threatening America with a "massive nuclear disaster" and "all-out war" if war breaks out on the Korean peninsula.[39]

Iran, another foe, does not currently have nuclear weapons but has voiced its interests in pursuing nuclear weapons and could have the capacity in the near future to develop a weapon.[40] It is thought that Syria was working toward developing their own nuclear capability in the past, possibly with the help of North Korea, but it currently does not have the industrial capacity to pursue developing its own weapons. [41] With the current state of turmoil in Syria, it would be hard to determine if the regime feels threatened enough to reconsider pursuing its own nuclear weapons. Even though North Korea, Iran, and Syria are not currently

existential threats, the possibility of that changing is real. Conventional threats will not always deter rogue nations. There may come a time when a nuclear threat against an enemy regime is necessary. Without ICBMs, such threats may not effectively deter an adversary. In order to defeat the United States before a potential war begins, an adversary could attack submarine and bomber bases without warning. This range of strategic challenges makes the ICBM force relevant for the long term.

Detractors argue that this rapid response is a large reason ICBMs are destabilizing but that is simply wrong. First, categorizing ICBMs as sitting on "hair trigger" alert is intentionally misleading and serves only to excite the public by giving the impression that at any moment an ICBM can be launched without permission. While the ICBM force is always on alert and ready to respond promptly, there are multiple layers of controls ensuring launch could only occur upon Presidential direction.[42] As an additional hedge, ICBMs are targeted, day-to-day, towards the open ocean. In the unlikely event of an unauthorized or accidental launch, missiles would land in the ocean, preventing an adversary from believing they were under attack.[43] Finally, the Minuteman III has a superb safety record with no incidents that have had the potential to allow for accidental or unauthorized launch.[44]

There are two primary reasons that ICBMs must remain on constant alert. First, although the relationship between Russia and the United States is much improved since the Cold War, the two countries still have differences. Russia maintains the alert capability to launch an attack against the United States or its allies. Although Moscow does not have malicious intent, that can change, so the United States must be ready to respond.[45] Additionally, America has assured its allies that it will come to their aid in the event of a nuclear attack. ICBMs on alert are a continual reminder to allies that America stands by its pledge.[46] Without this assurance, today's U.S. allies may feel the need to develop their own nuclear capability or shift their alliance to another nuclear country, potentially an American nuclear foe, to serve as "nuclear guarantor."[47]

ICBM opponents argue that ICBMs are destabilizing as they force adversaries to target the U.S. homeland. This critique is flawed. Detractors are accurate in saying that ICBMs cause adversaries to target the United States but are mistaken in suggesting this is destabilizing. In reality, the fact that an adversary must target the United States is a tremendous

deterrent against use of nuclear weapons, as an adversary will need to think long and hard about the consequences of striking another country's sovereign territory. [48] Potential adversaries need only look at how the United States responded to the September 11, 2001 and Pearl Harbor attacks to get an idea of how Americans would react if attacked by a nuclear weapon.[49] American satellites are also able to detect the location of an ICBM launch and thereby easily attribute the attack to the responsible country, leaving no doubt that Washington would know who is responsible.[50] Targeting American ICBM fields also forces adversaries to think twice before launching an attack, and, by doing so, it compels them to realize the benefits of attacking the United States are outweighed by the costs.[51]

Finally, the sheer number of ICBMs and the size of their dispersal area present a targeting problem for Russia or any adversary. If the United States did not have ICBMs, adversaries would only need to target as few as 13 locations to render America's nuclear arsenal useless.[52] SSBNs have one base on each coast and the bomber fleet is in three locations, so it is easy to see how a nuclear power could readily threaten the U.S. non-ICBM nuclear force. Figure 2 shows the number of warheads required to eliminate the U.S. ICBM force and non-ICBM targets, illustrating that without ICBMs, just about any nuclear nation could be America's nuclear peer.[53]

As previously stated, American ICBMs are located over a large area, making it improbable that a nuclear peer could dismantle the entire force in one salvo with any hope of having a meaningful arsenal left for contingencies, reprisal, or blackmail. [54] This, in effect, counters the argument that with ICBMs, the United States may be inclined to launch on warning instead of actual attack, because a significant fraction of the ICBM fleet will likely survive an attack.

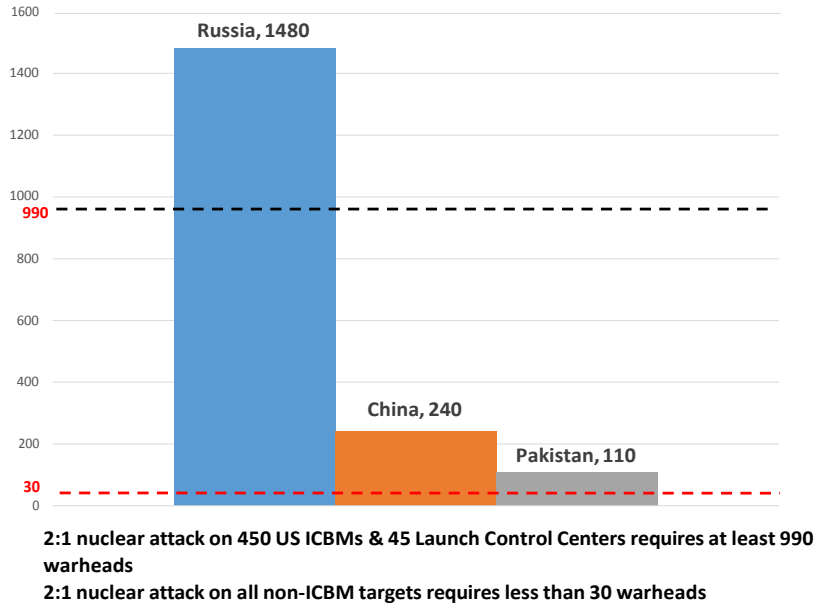

Figure 2: 2:1 Attack on ICBM vs Non-ICBM Targets

Each Minuteman III can hold up to three warheads (MIRVs), but as an additional hedge to global nuclear stability, the United States is placing a single nuclear weapon on each missile.[55] The theory of "de-MIRVing" is to make ICBMs a less lucrative target: the launch facilities are hardened structures, an adversary will need to expend at least two warheads to destroy a single U.S. warhead.[56] In order to destroy the U.S. ICBM forces, Russia would need 900-1,350 weapons. With a New START treaty limit of 1,550 total warheads, a debilitating attack on the United States would leave Russia with little in reserve.[57] To label ICBMs a "warhead sponge" is to suggest that a critic would prefer an adversary's nuclear weapons to be targeted at American cities rather than rural ICBM fields. Instead, it is far better for an adversary to focus on destroying a U.S. second strike capability, because allowing it to remain intact would ensure total destruction—a reason to give any adversary pause when contemplating an attack against the United States.

One factor to look at when determining ICBM relevancy is reliability. ICBMs performed well in the past and can be counted on to

work as expected if launched against an adversary.[58] The Minuteman III ICBMs have an alert rate of nearly 100 percent, meaning nearly all of its fleet is configured and available for launch at any time.[59] Although the United States does not test launch ICBMs from operational missile fields, the ICBM community does extensive testing of each portion of the system to ensure it will work if launched. Several times a year, there are test launches of non-nuclear tipped ICBMs from Vandenberg Air Force Base, and U.S. Strategic Command conducts command and control exercises to ensure Presidential directions are properly sent to the nuclear fleet and responded to appropriately.[60] Although ICBMs cannot serve as a visual signal of American resolve, like bombers, reliability is a signal to both allies and adversaries that the United States is always ready to respond to a nuclear threat. In fact, a country such as Japan may prefer having the United States provide extended deterrence via a reliable, nonvisible ICBM force to avoid having an observable U.S. nuclear presence in their country.[61]

Another key attribute of ICBMs is the ability of missile combat crews to quickly retarget their missiles if threats change or an unforeseen target emerges. The system was designed in part to allow the missile combat crew to quickly retarget their missiles and then promptly launch them. Therefore, the operating system and crew reaction allow decision makers time to determine exactly whether a nuclear attack is needed and what it should target.[62] Given the Minuteman III's accuracy – Circular Error Probable (CEP) – the President can use either a single or a small number of ICBMs launched at a precise location, localizing effects and signaling the U.S. intent to keep the conflict smaller, with a goal of de-escalating the crisis. [63] At the same time, this would show American resolve and capability to continue up the escalatory ladder as needed.

Finally, detractors contend that overflying Russia or China would make using an ICBM a poor choice for the President. However, if the situation required an ICBM strike, it is highly likely the President would consult with any country in the flight path, and overflight concerns should not unnecessarily constrain action. Overflight could be avoided by choosing a suboptimal flight path and increasing the CEP, a tradeoff that might be acceptable when national security is at risk.

Not only do ICBMs have physical attributes needed to provide for national security, they also provide nuclear deterrence at a low cost. The

2014 DOD budget was $618 billion; $12 billion was specifically budgeted for strategic (nuclear) forces.[64] The entire ICBM force costs less than $1 billion annually to operate and maintain—less than 0.2% of the total defense budget.[65] The cost is so low that removing ICBMs from the fleet will provide little real savings, contrary to assertions otherwise. ICBMs recently underwent modernization upgrades that will keep them operational at least through 2030.[66]

The Air Force is also working on the follow-on to the Minuteman III. Estimates suggest the future system will cost about $20-70 billion.[67] This may seem like a large investment, but actually it is less than 0.6% of the total defense budget over the length of the modernization activities. Additionally, since the system is land-based, without flight or at-sea costs, it should remain the least costly nuclear weapon system in the U.S. nuclear arsenal. Figure 3 illustrates the extremely low costs of the ICBM relative to both the strategic forces as a whole and the entire DOD budget.

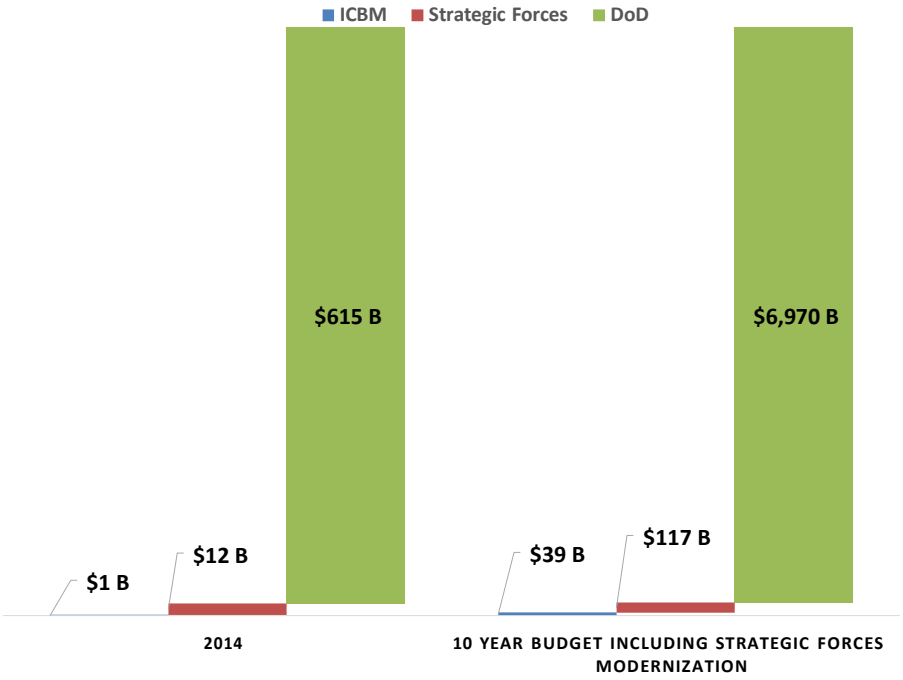

Figure 3: ICBM Costs Relative to Strategic Force and Entire DOD Budget[68]

It is important to note that the ICBM's development to counter a Cold War threat does not make it irrelevant in today's security environment. America needs to be prepared to counter both traditional and emerging threats, while at the same time retaining the capability to defeat nations that today are not considered nuclear threats but may become threats in the future. There are no indications that adversaries intend to divest themselves of their nuclear weapons programs. Americans would be mistaken to believe that they or their allies would be more secure without a nuclear arsenal. Rather, the United States and its allies are best protected by a credible ICBM force.

Recommendations

Modernize and recapitalize the ICBM fleet

The Minuteman III is currently undergoing LEPs to maintain viability through 2030. However, now is the time to begin working toward a next-generation ICBM. From a practical perspective, ensuring that a follow-on ICBM program becomes part of the research and development program of record is essential, given the difficult defense budgets ahead. Once employed, a new system is likely to prove of similar cost effectiveness to the Minuteman III. While initial development costs will prove significant, as are the development costs of all weapon systems, the long term return on investment will make a next-generation ICBM well worth the expenditure. That being stated, the physical infrastructure at the launch facilities is sound despite its age, and it does not require many, if any, upgrades. The follow-on ICBM and control centers should be housed in the existing facilities, with an estimated saving of several billion dollars in modernization costs.[69] Sixty-nine Minuteman III LEPs were designed to keep the system operational through 2020; attempting to push it much past the 2030 timeframe courts significantly decreased reliability, reducing the credibility of the nuclear force.

Do not reduce the number of ICBMs below 450

Under the current force structure, Russia will need to attack 450 ICBMs along with 45 launch control centers to destroy America's ICBM

force, requiring about two-thirds of its warheads. Further reductions in the ICBM force structure leaves the United States significantly vulnerable to a debilitating attack and with only a limited second-strike capability. Reducing the number of ICBMs also diminishes the confidence U.S. allies have in the country's pledge of extended deterrence. In short, the smaller the U.S. arsenal, the greater the chance of proliferation, as U.S. allies may be concerned that if the United States has fewer nuclear weapons, Washington will reserve them to protect the homeland. This could drive American allies to develop their own nuclear arsenals. Adversaries with smaller arsenals may interpret further American reductions in ICBMs as a signal that there is an opportunity to become nuclear peers, encouraging the development of additional weapons and systems. Retaining less than 450 ICBMs not only makes the United States more vulnerable to Russian attack, it also risks increasing proliferation by both friend and foe.

Do not reduce on-alert posture of ICBMs

Detractors believe that the on-alert posture of the ICBM is destabilizing and could lead to mistaken launch. The 2010 NPR initiated studies to consider lowering the on-alert posture of ICBMs in the future (although the report did not recommend immediate changes to the alert posture).[70] To reduce the ICBM alert posture removes one of the key components of a reliable nuclear force: prompt response. The current posture keeps adversaries' targets at risk around the clock, ensuring the United States will not be caught by surprise and unable to respond. It also gives the President as much time as possible to decide if a nuclear strike is required.[71] Without ICBMs on alert, the President may feel more rushed to make a decision knowing the time it takes to ready an ICBM force that is not on alert. Having ICBMs on continual alert ensures both launch and maintenance crews maintain the proficiency needed to ensure flawless operations. Without a constant alert status, crews run a greater risk of error. Finally, building in a delay leaves the United States and its allies vulnerable to an unexpected attack, possibly prompting allies to build their own force since they do not believe they can rely on the United States to act immediately.

Consider developing a small force of mobile ICBMs

The 2010 NPR recommended exploring basing options to maximize survivability of the ICBM force.[72] Although the United States should maintain and modernize the current fleet of 450 ICBMs, DOD should explore the possibility of enhancing this force through a small fleet of mobile ICBMs. Mobile ICBMs would increase the number of targets, further complicating targeting for nuclear foes, along with building in additional survivability together with the rapid response of on-alert ICBMs. Mobile ICBMs enhance survivability by being difficult to locate, because they are not in a fixed location and have the ability to use natural barriers, such as mountainous terrain, as an added measure of protection from incoming missiles. Not only does a mobile ICBM force provide the President with the same on-alert posture as the current ICBM, but it also serves as a hedge against an adversary developing technology in the future which would allow easy detection of nuclear-armed submarines in the seas.

Conclusion

Weapons developed during the Cold War to combat a specific enemy, the Soviet Union, cannot be deemed obsolete or unnecessary solely because the contemporary security environment is different. In reality, threats to the United States and its allies have changed and expanded, a fact that makes the ICBM just as relevant today, if not more so than when the system was first conceived. Russia and other potential adversaries have shown no inclination to remove nuclear weapons as a key component of their warfighting arsenal.

The United States, both for its own internal security and the security and assurance of its allies, needs ICBMs to ensure nuclear deterrence. However, in order for the weapon system to be an enduring, credible threat, the United States must modernize the force and keep 450 missiles on alert while exploring the possibility of increasing the weapons' survivability by adding a mobile ICBM to the fleet. Without the ICBM, the United States will become a minor nuclear power, making it much more vulnerable to a nuclear attack and potentially paving the way toward greater nuclear proliferation by allies who no longer have faith that the

U.S. nuclear umbrella will protect them. Nuclear weapons are not just for destruction, they are first and foremost to ensure deterrence; the fewer the targets an adversary needs to eliminate to dismantle a nuclear force, the lower the chance of deterrence.

Notes

1. This paper does not discuss any attributes which would make either of the other legs of the nuclear triad obsolete. The other legs of the triad are SLBMs and long-range bombers. The three parts of the triad together are designed to provide the President with options to ensure the strategic security of both the United States and its allies.

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CHAPTER 5

Strategic Ballistic Missile Submarine: A Necessary but Uncertain Future

Donald M. Neff

> "It is a doctrine of war not to assume the enemy will not come, but rather to rely on one's readiness to meet him; not to presume that he will not attack, but rather to make one's self invincible."
>
> **Sun Tzu, The Art of War**

Since 1960, when the *USS George Washington* began its first Polaris armed nuclear deterrence patrol, SSBNs have been a pivotal element in the United States' nuclear triad. For the 44 years of the Cold War, the SSBN brought unique capabilities to the nuclear deterrence mission and helped ensure American forces' survivability, mobility, and credibility. After the fall of the Soviet Union precipitated drastic reductions to America's nuclear arsenal, the viability of the nuclear triad of bombers, ICBMs, and SLBMs was called into question by academics and policy makers in and out of the military who advocate eliminating one or more leg of the triad and changing the nation's nuclear posture.

In his 2009 Prague speech, President Barak Obama, while committing to a world without nuclear weapons, said, "As long as these weapons exist, the United States will maintain a safe, secure and effective arsenal to deter any adversary, and guarantee that defense to our allies…."[1] The following year, the administration's NPR concluded that the U.S. nuclear triad would be maintained under the New START agreement which limited America's arsenal to 1,550 operationally-

deployed strategic nuclear weapons. [2] In his 2013 Berlin speech, the President further committed to negotiating a further reduction of Russian and American arsenals of up to one third.[3] While criticized by Russian leaders, Obama's comments underpin the growing momentum to reduce the role played by America's nuclear force.[4] Continued calls for further force reductions amid persistent Global Zero lobbying efforts and significant fiscal pressures will challenge triad proponents to offer a clear defense of the arsenal as legacy weapon systems begin to reach the end of their service life expectancies.

Despite a volatile and uncertain fiscal and strategic environment, the current Ohio-class SSBN and its planned replacement (SSBNx) will remain a crucial element of the United States' strategic nuclear deterrent. The unique capacities that the SSBN brings to the nuclear triad may not, however, be enough to counter the increasing pressure to reduce the nuclear arsenal and divest expensive weapon systems. The following pages will review the current and future SSBN force structure, plans, and timelines; assess arguments against and for the SSBN; and evaluate mission-expanding options that have potential to transform the SSBN from the silent Cold War weapon of its past to a flexible, projectable, and employable strike option to deter and counter current and future security threats.

SSBN Force Structure

As of September 2013, the United States had 1,688 strategic warheads deployed on a mix of 1,015 SLBMs and ICBMs and attributed to bombers.[5] Fourteen Ohio-class SSBNs remain in nuclear deterrence service and will be increasingly relied on as the nation's key strategic nuclear force. As the most survivable leg of the nuclear triad, the SSBN and Trident II D-5 SLBMs will comprise the majority of America's operationally deployed strategic nuclear weapons.[6]

Fielding and Treaty Obligations

With fourteen operational SSBNs in the fleet, two submarines are rotated through mid-life refueling and maintenance at any given time and are therefore not counted against New START numbers. Under the new

treaty, four of the twenty-four Trident missile launchers on each submarine will be eliminated, reducing the total number of deployed Trident launchers to 240 and total nuclear warheads to approximately 1,090. The total number of warheads will depend on the number of MIRVs loaded on each missile.[7]

In October 2004, the last of the Trident I (C-4) missiles were removed from the SSBN fleet and replaced with the larger and more accurate Trident II (D-5) SLBM. The increased range of the D-5 allows SSBNs to expand their potential patrol areas, further complicating opponents' defenses. Actual combat range of the three-stage, 130,000 pound D-5 is classified and depends largely on payload weight. Effective missile range is estimated, however, to be in excess of 4,000 nautical miles.[8] While the D-5 is capable of carrying up to eight MIRVs, under New START counting rules the United States can download, customize, and tailor MIRV packages for each missile depending on target characteristics and ranging requirements. The United States will only be required to disclose the total number of warheads deployed, not how many weapons are loaded on each missile.[9]

To improve targeting options against potential opponents in Asia, nine Ohio-class SSBNs are based at Naval Base Kitsap Bangor, Washington, with the remaining five stationed at Kings Bay, Georgia.[10] With each base having one boat continuously undergoing refueling and maintenance, twelve submarines (eight in the Pacific and four in the Atlantic) are operational at all times, with approximately half on nuclear deterrence patrol.

Service Life Extensions

Ohio-class submarines became operational between 1981 and 1997, with an extended 42-year service life comprised of two 20-year operational periods divided by a two year refuel/overhaul process.[11] In 2027, the first Ohio-class submarine will reach the end of its service life, with the remaining submarines timing out at approximately one per year and full retirement occurring in 2040 (see Figure 1). To match the life expectancy of Ohio-class submarines and serve as the initial SLBM for the follow-on SSBNx, the Trident II D-5 and mated W-76/88 reentry vehicles will be updated through programmed life-extension efforts.[12] By the end

of 2029, the first two Ohio-class SSBNs will have reached the end of their service lives, and the follow-on replacement SSBNx will need to become operational to replace the retiring boats without affecting continuous nuclear deterrence patrols.[13]

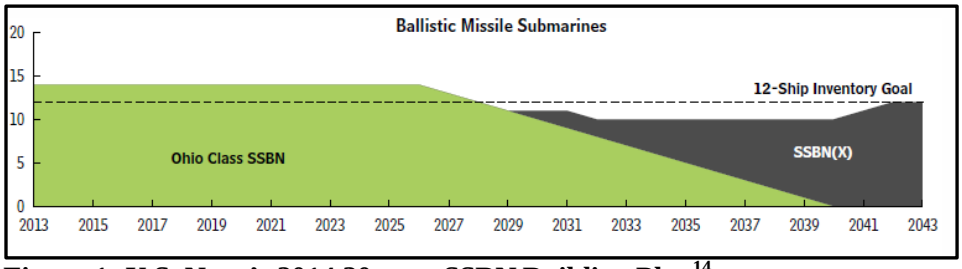

Figure 1: U.S. Navy's 2014 30-year SSBN Building Plan[14]

Ohio-class SSBN Follow-on (SSBNx)

The U.S. Navy (USN) plans to procure twelve SSBNx to replace the fourteen Ohio-class submarines, with the first SSBNx becoming operational in 2030 and the last in 2042 (see Figure 1).[15] The SSBNx is expected to be more sustainable and less prone to maintenance issues than Ohio-class vessels. Therefore, according to the Navy, only ten operational SSBNx boats will be needed to ensure nuclear deterrence.[16]

The new submarine will have the same 40-year life expectancy but will not require the same lengthy two-year mid-life refueling overhaul as the Ohio-class boats.[17] Combining the current procurement and retirement plans, the Navy acknowledges the risk of reducing the total number of operational ballistic missile submarines to just ten between 2032 and 2040 but mitigates the problem by not having any Ohio-class boats undergoing mid-life overhaul during those years. The life-extended Trident II D-5 will be the initial SLBM deployed on the SSBNx, and each submarine will carry sixteen missiles compared to the twenty carried on the latest modified Ohio-class. [18] After initial engineering costs are incurred, the Navy hopes to limit the expense of each SSBNx to $4.9 billion per submarine, with construction of the first submarine slated for 2021.[19]

Opponent Arguments

With the continued reductions of strategic nuclear inventories in line with the New START Treaty and reduction goals made by President Obama in his Berlin speech, the strategic missile submarine will continue to be relied on as a safe and secure projector of America's nuclear forces. However, detractors make several arguments against the development and employment of strategic ballistic missile submarines.

First-strike Weapons Destabilize Strategic Deterrence

Disarmament proponents contend that the unique stealthy nuclear strike characteristics presented by the SSBN, coupled with advancements in worldwide anti-ballistic missile (ABM) technology and conventional prompt global strike weapons, create a first-strike capability targeted against any adversary. [20] So-called first-strike capability is where a disarming first attack against an enemy's forces can be achieved to the degree that the enemy is unable to strike back effectively.[21]

It is argued that the United States' emerging conventional-nuclear sword and shield will be comprised of the traditional nuclear triad as well as a globally-deployed network of anti-ballistic missile interceptors capable of neutralizing an opponent's retaliatory nuclear response. This strategic build up, coupled with the Pentagon's "Pivot to Asia," is argued to be a destabilizing force in the Pacific region, which may encourage China and Russia to form stronger diplomatic and military ties to counter-balance the United States.[22]

As argued by these opponents, the ability of Ohio-class ballistic missile submarines to carry the Trident D-5 SLBM, patrol off the coasts of China, Russia, and North Korea, and strike targets with minimal detection and flight time threatens to destabilize the nuclear balance of power. Further, say opponents, the absolute numbers of weapons needed for effective nuclear balance and deterrence is less relevant than the ensured capability to counter-strike. As long as balancing nations have adequate second-strike capability, strategic deterrence is likely to be achieved.[23] If improvements to the current and future SSBN force, coupled with ABM and counter-force/denial capabilities emerge, the second-strike capability of America's adversaries will be neutralized, and strategic deterrence will

be threatened, resulting in a destabilized strategic environment and potential conflict and arms proliferation.

Well-intentioned, Unauthorized Nuclear Weapons Release

An enduring argument against the fielding and deployment of SSBNs, originally posed by RAND Corporation analysts, suggests there is a threat of well-intentioned but unauthorized use of nuclear weapons.[24] Because of the remote and concealed nature of SSBN employment and reliance on slow and less robust command, control, and communication (C3) systems, an unintentional catastrophic nuclear attack scenario can be articulated. In an environment of rapidly-escalating world tensions, it is reasoned, an SSBN could receive word that the United States is under attack, at which point C3 systems fail. Unknowing of actual world events and the nature of the attack and fearing for their own survival, the commander and crew of the SSBN could launch their SLBMs, triggering a full nuclear response from the targeted state and in-kind retaliation by the United States. With this logic, one of the SSBN's greatest strengths (the autonomous and decoupled nature of SSBN nuclear deterrence operations) exposes and increases unwarranted risk of unintended and unauthorized nuclear weapons release and is thus inherently dangerous and destabilizing.

Second-strike, Counter-value Credibility

The pivotal role of SSBNs in America's nuclear triad is to maintain a credible and survivable second-strike capability that ensures balanced strategic deterrence, regardless of enemy nuclear forces or capabilities.[25] However, the actual utility and credibility of these forces can be called into question. If deterrence fails, the nature of a second-strike against an opponent, in response to their first use, is likely to be a punishing counter-value attack against that nation's cities and populations.[26] This argument reasons that counter-force targeting against enemy defenses and strategic weapons in a second-strike attack would be ineffective, because enemy missiles and bombers would have already launched. Attacking empty missile silos and vacant airfields with retaliatory SLBMs would be fruitless. Following this logic, the only credible threat behind the SSBN's second-strike is that the SLBMs are

targeted against enemy cities and population centers, holding what the enemy values at risk of destruction. Two critical questions emerge that challenge the deterrent validity of the SSBN's second-strike capability. First, does the enemy *value* what is targeted enough to dissuade it from launching a first strike? Second, would an American President, faced with eminent destruction of the United States, authorize a massive counter-value, counter-population attack that potentially kills millions of people—knowing that the decision to attack was not that of the citizenry but the government? If either answer is no, then the utility and credibility of the SSBN as a second-strike platform is questionable. Since the United States has never adopted a no-first-use nuclear policy, the limited and less credible counter-force second strike utility of the SSBN bolsters opponents' argument that nuclear armed submarines are destabilizing first-strike weapons.

SSBNx Expense Degrades Conventional Forces, Increases Reliance on Nuclear Weapons

The second-strike capability, and resulting deterrence, provided by the SSBN is only applicable to adversaries with a credible first-strike capability, namely Russia and China. Lesser powers such as North Korea or a nuclear-armed Iran that decide to launch a nuclear attack against the United States or its allies would not have the ability to cripple North American-based retaliatory forces and would face the prospects of total destruction from continental assets. Whether the American counter-strike would remain conventional or escalate to nuclear is less important to the role played by the SSBN, as SLBMs would not necessarily be required for retaliation. Further, any nuclear exchange with Russia or China would likely be an escalation of a conventional conflict in which all U.S. nuclear forces are at heightened levels of readiness and prepared to launch prior to an enemy's decapitating first-strike.

Although inaccurate, it is possible to conclude from this discussion that the only utility that SSBNs provide is against an unlikely attempt at a surprise decapitating counter-force first strike launched by Russia or China. The costs of developing and fielding the Ohio-class replacement will certainly compete for limited resources with the Navy's conventional forces. Should fiscal circumstances deteriorate further, a reduction in the

projected SSBNx program could jeopardize the credibility of the seaborne leg of the nuclear triad. However, should the Navy develop the SSBNx at the expense of conventional shipbuilding plan, the United States could be pressed into relying more heavily on less flexible nuclear deterrence to maintain security and stability in the international system.[27]

The Navy's 2014 shipbuilding plan and requested budget averages $21.2 billion per year for the next 30 years.[28] This planned outlay, derived by the Congressional Budget Office (CBO), is 13% higher than the Navy's $18.7 billion estimate and 34% higher than average amounts the Navy has received in recent decades (see Figure 2).[29]

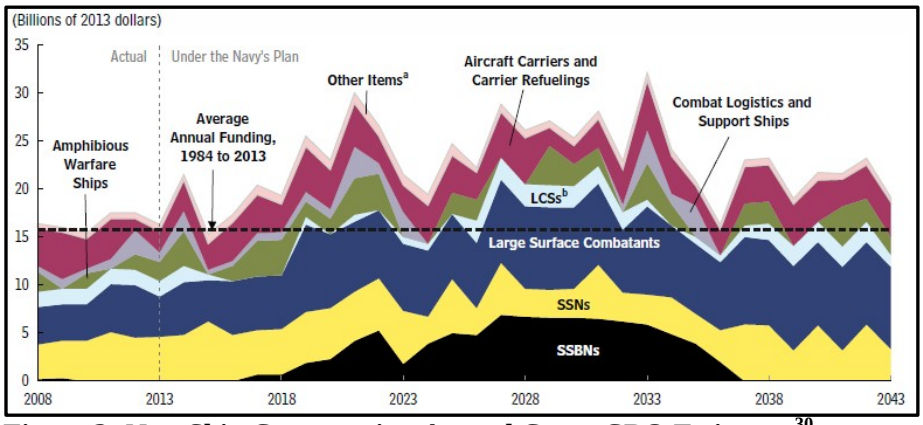

Figure 2: New Ship Construction Annual Costs–CBO Estimates[30]

Between 2014 and 2043, the Navy plans to procure 266 ships for a CBO calculated total cost of $636 billion in 2013 dollars (see Figure 3).

Generating an accurate cost estimate of fielding the twelve planned SSBNx is highly problematic and uncertain. In 2008, the Navy estimated per-submarine cost at $3.8 billion but revised that number up in 2011 to $7.9 billion, a 108% increase in three years. The CBO estimates the total SSBNx cost to be $97-102 billion, or $7.2 billion per submarine plus $10-15 billion in research and development costs for the program.[31]

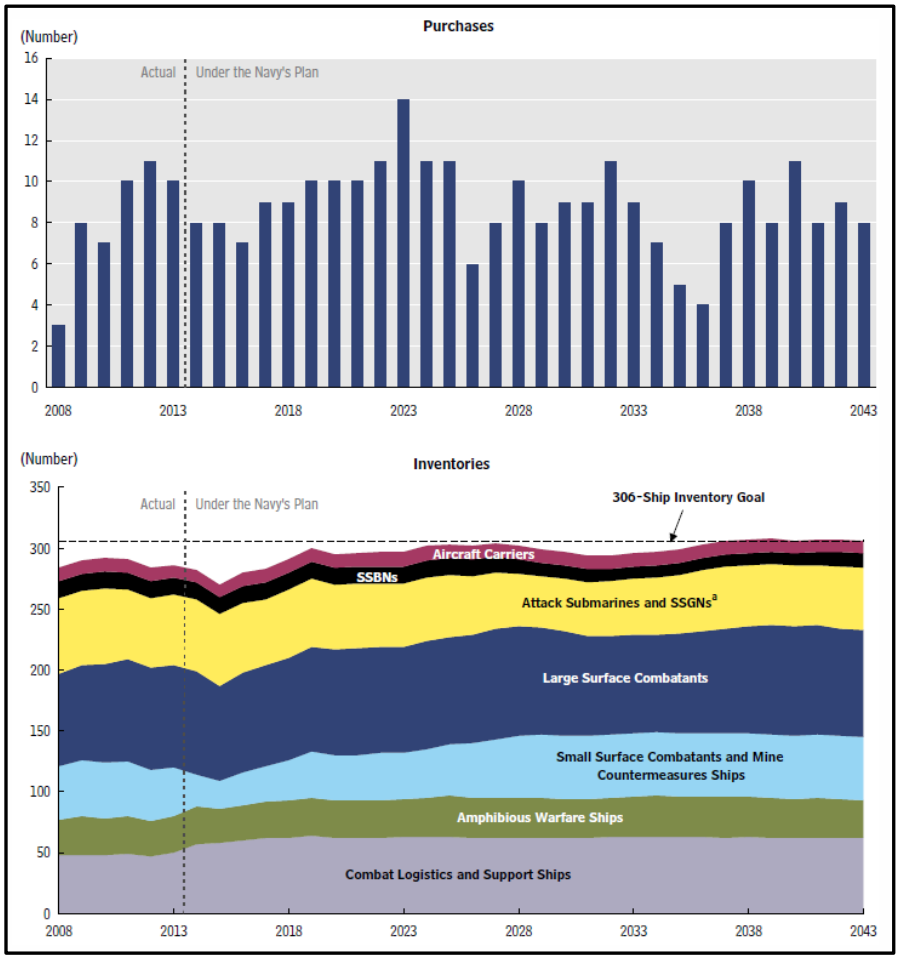

Figure 3: US Navy's 2014 30-year Annual Ship Purchase and Inventory Plan[32]

At $100 billion, the SSBNx accounts for 15.7% of the Navy's total 30-year shipbuilding budget but only represents 4.5% of the desired ships; 12 of 266 hulls planned. As one of the Navy's highest procurement priorities, dedicating disproportionate funds to the SSBNx will be at the expense of lesser-ranked combatant ships, calling into question U.S. conventional naval requirements.[33, 34] Compounding cost inaccuracies, the CBO evaluates that between 2014 and 2021, DOD underestimates its Future Years Defense Program (FYDP) budget by $209 billion.[35] The CBO also estimates that the Navy acquisition budget requirement will

jump 10% in 2018 and an additional 16% in 2019 (see Figure 4).[36] In an environment of shrinking federal budgets and automatic spending cuts forced by the Budget Control Act and resulting sequestration, it is unrealistic for the Navy to assume its 30-year ship building plan will be fully funded. Allocating disproportionate funding to SSBNx could force a reduced conventional naval capability and decrease projectable U.S. power (quantity has a quality all its own) and could – as mentioned – drive an increased reliance on less-credible, low-utility nuclear forces. Placing the Navy in such a position may make it difficult to justify the limited role SSBNs actually play in the USN's force structure.

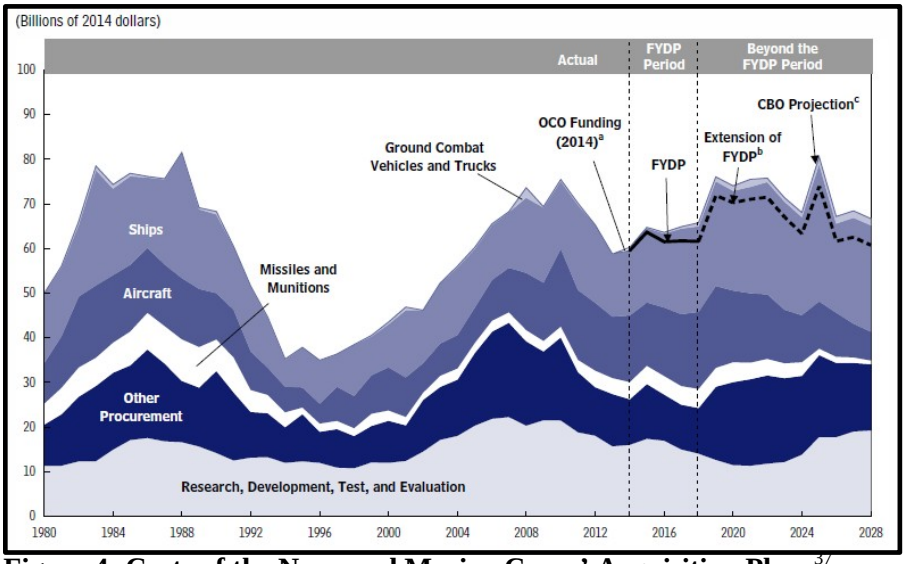

Figure 4: Costs of the Navy and Marine Corps' Acquisition Plans[37]

Proponent Answers

First-strike Weapons Destabilize Strategic Deterrence

The argument that offensive nuclear weapons, coupled with ABM systems, effectively negate an opponent's second-strike capability and thus destabilize balances of power is not an argument against the submarine-based leg of the triad. Any destabilizing effect an ABM system might pose would not necessarily rely on submarine-based missiles as its offensive arm. Operating under a protective shield, land- or air-based

weapons could execute a first strike while retaliatory missiles are intercepted by an ABM system. Following this logic, any comprehensive ABM system would ensure first-strike survival of more cost effective land-based ICBMs, thus eliminating the need for SLBM entirely.

However, this argument is faulty, as no ABM system is likely to be 100% effective. Also, despite shortened flight times, SLBMs are unlikely to be capable of a crippling counter-force first strike. Both China and Russia have developed and deployed highly-mobile ICBM systems which, while capable of being targeted with maneuverable high-yield weapons, are difficult to locate and continuously track.[38] For example, as seen in the 1991 Gulf War, despite having complete air supremacy and an enduring presence, the United States was unable to locate or destroy Iraqi Scud missiles targeted and launched against Israel. [39] Despite dramatic improvements in intelligence, surveillance, and reconnaissance technology since 1991, given a non-permissive environment, extensive geography, enemy countermeasures, and the extreme consequences of failed interdiction, it is highly unrealistic that national decision makers would contemplate a first strike in expectation of destroying most mobile and silo-based launchers.

The most conclusive argument against viewing SSBNs as first-strike weapons lies in the number of deployed missiles and warheads. Given the reduced estimate of 1,090 total SLBM reentry vehicles, re-posturing of the SSBN force to nine boats in the Pacific and five in the Atlantic, and the common practice to have half the vessels on deterrent patrol, approximately 467 warheads would be available for an American SSBN surprise nuclear first-strike.[40] This number of SLBM warheads is inadequate to carry out a wholly-crippling first strike, given that New START limits restrict deployed strategic inventories to 1,550 and that Russian and Chinese SSBN deterrence patrols could not be effectively targeted. Increasing the number of American submarines on patrol to boost the number of reentry vehicles, and/or generating North American based nuclear forces, would signal an increase of the United States' nuclear posture to adversaries, thus hampering the element of surprise and triggering a countering increase of enemy nuclear force posture.

Well-intentioned, Unauthorized Nuclear Weapons Release

While an enduring and popular argument for authors and movie makers, the idea that a rogue SSBN commander would launch an unauthorized nuclear strike is highly problematic and unlikely. Robust and redundant communication systems coupled to clear command and control protocols all but eliminate potential unauthorized release. Physical and procedural permissive action links (PALs) dramatically reduce risk and are proven safeguards that have secured the United States' nuclear inventory for many decades.[41] A survivable, reliable, and secure top-down Nuclear Command and Control Systems (NCCS) ensures the sole authority for nuclear employment and termination is retained by the President. [42] Absent definitive nuclear release authority issued by the President, warheads, weapons, and fire control systems are locked, preventing unauthorized use.

Second-strike, Counter-value Credibility

While Russia and China pose a first-strike existential threat to the United States, lesser adversarial nations, while theoretically able to execute a nuclear strike against the United States, do not have the capacity to threaten all continental-based retaliatory forces. Thus, the submarine-based deterrent force is not fully directed toward these lesser states or third party non-state actors, although it can be on short notice. The two questions posed earlier are initial points to evaluate the effectiveness of SSBN second-strike credibility. First, does an adversary sufficiently value the targets of the SLBM enough to deter a first-strike attempt? And second, would an American President authorize a counter-value nuclear response, knowing the fate of the United States is largely set? It is argued that all of Russia's or China's strategic missiles would have been launched during the initial attack; therefore, SLBMs would target population centers with limited strategic significance.

It is incorrect to argue that significant strategic targets would not remain for an American retaliatory strike. Airfields, naval bases, aircraft carriers, munition depots, petroleum reserves, fielded military forces, and, most critically, leadership and command and control nodes would all still exist for American SLBMs to strike. These viable strategic centers of

gravity undermine the foundation of the second question, namely that the President would be authorizing strikes against Russian and/or Chinese population centers rather than counter-force targets. Related to this point, the first question relies on the assumption that SLBMs would only target the less-valued – by the Russian and Chinese governments – enemy population. To take this view requires a somewhat risky interpretation of what Russian and Chinese leader's value. If the highly-probable assumption is that the regimes are most interested in self-preservation, then an assured wholly-devastating nuclear attack on military and governmental targets would provide sufficient deterrence and prevent an initial attack. At the heart of nuclear deterrence is the mindset of the targeted opponent. The calculated ambiguity of what an American President might target with the secure SSBN second-strike force adds to enemy uncertainty and complicates a decision. It is this uncertainty, increased risk, and ambiguity that underpin the foundation of a second strike's assured destruction and nuclear deterrent balance.

SSBNx Expense Degrades Conventional Forces, Increases Reliance on Nuclear Weapons

The most convincing argument furthered by opponents of the SSBN is the near-prohibitive cost of the program and uncertainty related to defense acquisitions.[43] The GAO's estimated 34% funding increase from historical levels is highly improbable given the declining fiscal environment for defense spending. To fully fund the development and fielding of the SSBNx under historically consistent budgeting, the Navy will be force to curtail or eliminate portions of the total shipbuilding plan. Assuming forecasted procurement costs are accurate and the Navy receives historic funding, either fewer ships can be built or construction plans must be pushed further into the future to equalize the fiscal imbalance. Another option that should be considered is to increase the utility of the SSBN by incorporating conventional capabilities in addition to the traditional mission of strategic nuclear deterrence. By fielding a multi-role SSBNx, excess capacity and capability of other sea-based platforms can be eliminated, thus reducing fiscal pressures on the shipbuilding budget.

Recommendations

Re-emergence of the Tomahawk Land Attack Missile—Nuclear (TLAM-N)

The 2010 NPR made a significant decision to retire the nuclear-armed sea-launched cruise missile (TLAM-N).[44] This is a misguided and mission-limiting decision that should be reversed. While American non-strategic (tactical) nuclear weapon inventories have been dramatically reduced since the end of the Cold War, complete reliance on the B-61 gravity bomb mated to retiring F-15s, F-16s, and yet- to-be-fielded F-35s, as well as ALCM-armed B-52s, exposes the "tactical" nuclear force to unwarranted risk.

The NPR describes the TLAM-N as a redundant weapon within the stockpile due to the ability to engage targets with strategic ICBMs and SLBMs. Ballistic missile overflight problems negate this logic as rapidly emerging targets – a justification for the employment of ICBMs – would most likely require overflight of Russian and/or Chinese airspace in direct contradiction to U.S. nuclear operations doctrine.[45] Use of no-overflight SLBMs is equally problematic due to much higher yields of the Trident II D-5 warhead and MIRVs. Additionally, unlike TLAM-Ns, warheads mated to either ICBMs or SLBMs would count against New START limits as deployed strategic weapons.

The few forward-deployed tactical nuclear weapons supporting NATO, combined with the small stockpile maintained in the United States, substantially reduce the flexibility, capability, and credibility of extended regional deterrence. Equipping the current cruise missile submarine (SSGN) force with nuclear-armed TLAM-Ns, and designing a TLAM-N capability into the SSBNx, will allow the United States to maintain forward-deployed tactical nuclear weapons, ensuring extended deterrence to allies and flexible attack options for the President. The lower-yield submarine-deployed TLAM-N provides a unique capability of a stealthily, responsive, and secure nuclear weapon to target rapidly-emerging, dynamic, and potentially non-deterable threats throughout the world.

Prompt Global Strike: Conventional Submarine-Launched Ballistic Missiles

In its 2001 NPR, the Bush administration called for a new strategic triad consisting of offensive strike capabilities, active and passive strategic defenses, and a new responsive American defense, development, and procurement infrastructure.[46] To deter and, if necessary, defeat emerging threats and adversaries in the twenty-first century, the 2001 NPR surmised that the offensive strike leg of the triad can no longer rely solely on nuclear-armed forces but must also leverage precise conventional global strike options.[47] To this end, the USN has repeatedly requested funding to research the Enhanced Effectiveness Initiative to significantly improve targeting accuracy of the Trident II (D-5) reentry vehicle and thus make conventionally-armed SLBMs a viable option.[48] While Congress persists in denying direct funding for the Conventional Trident Modification (CTM), the weapon systems manufacturer, Lockheed Martin, initiated low-level research and testing of the new reentry vehicle in 2002. Lockheed's test flights demonstrated improved accuracy, terminal warhead maneuverability, and the ability to slow atmospheric reentry in order to control impact angles and conditions.[49]

New global threats will continue to emerge that require a prompt strike capability where forward-deployed forces do not exist or are insufficient to address the threat.[50] With these niche targets, the long-range precision strike capability of conventional ballistic missiles (CBMs) may prove the lowest risk and fastest option for strategic decision makers as global intelligence operations continue to shorten the strike decision cycle.[51] The use of conventional SLBMs for precision global strike (PGS) engagements further negates overflight concerns posed by North American-based conventional ICBMs.[52] Conventionally-armed Ohio-class and future SSBNx submarines will allow stealthy forward deployment of PGS weapons without the excessive and vulnerable footprint required by heavy bombers or dual-use fighters. Persistent projection of SSBNs to unstable regions will give decision makers a long-range, precise, rapidly-employable, day or night conventional strike option capable of penetrating nearly any airspace while avoiding overflight of counties capable of detecting and tracking ballistic missiles.[53]

Conclusion

As long as large inventories of nuclear weapons exist in adversary silos and munitions inventories, the risk and potential cost of Global Zero is too great to accept. Continued nuclear inventory reductions will eventually force the Pentagon to consider significant trade-offs in the number and type of weapons maintained by the United States. [54] Additionally, deep cuts to America's nuclear arsenal may force a shift from traditional flexible response, minimum-level-of-force use doctrine to a less credible counter-value, counter-population targeting process. Drastic reductions of delivery platforms of all types will increasingly restrict nuclear forces' flexibility, resiliency, and survivability. Unsubstantiated faith-based, minimum-deterrence nuclear force structuring will inflict unintended consequences on national objectives, capabilities, and strategies, as well as impact the credibility of American extended deterrence.

The modern ballistic missile submarine, coupled with the latest Trident missile system, provides the United States a highly-survivable, secure, mobile, accurate, and timely delivery system capable of directly engaging any target anywhere on the earth's surface. Faced with the reality of contracting defense budgets and declining warhead inventories, the SSBN will play a critical role in America's nuclear deterrence and prompt global strike capabilities for the indefinite future. Developing and fielding a Trident-based CBM and redeploying the nuclear armed TLAM will allow U.S. forces to draw down strategic nuclear inventories, maintain a credible nuclear and non-nuclear second-strike capability, and guarantee America's extended deterrence commitments.

While the world's oceans are not transparent, they are not completely opaque. Discovering, tracking, and monitoring submarines will continue to be problematic for the United States and its adversaries. However, technological advances, coupled with smaller fleets, will reduce the SSBNs anonymity as it carries out its deterrence and strike missions. For this reason, while playing a critical role, the SSBN is only a portion of America's strategic triad.

Optimizing the strengths of the SSBN's delivery system by arming it with nuclear-armed cruise missiles and conventionally-armed long-range ballistic missiles will diversify the platform, further enabling

flexible-response options and allowing it to expand its role from its current singular purpose. To justify the disproportional construction expense, the new SSBN must be a multi-role platform, thus allowing reductions and cuts to less critical current and future programs.

Notes

1. Barak H. Obama, President of the United States of America, public address at Hradcany Square, Prague, Czech Republic, 5 April 2009.

2. . Department of Defense, *Nuclear Posture Review Report.* (Washington, DC: Office of the Secretary of Defense, April 2010), 20.

3. Barak H. Obama, President of the United States of America, public address at Pariser Platz, Brandenburg Gate, Berlin, Germany, 19 June 2013.

4. RIA Novosti, "Russia Skeptical over Obama's New Nuclear Reduction Proposal," *RIA Novosti*, 19 June 2013, On-line, Internet, available from en.ria.ru/russia/20130619/181755868/Russia-Skeptical-Over-Obamas-New-Nuclear-Reduction-Proposal.html. In response to Obama's Berlin comments, Russian Deputy Prime Minister Dmitry Rogozin harshly criticized the proposed reductions as "unrealistic" and in light of continued U.S. ABM efforts, "To show the lack of understanding of this [by proposing further nuclear cuts] – means either openly lying, bluffing and deceiving, or demonstrating a deep lack of professionalism."

5. Department of State, *New START Treaty Aggregate Numbers of Strategic Offensive Arms.* (Washington, DC: Bureau of Arms Control, Verification and Compliance, 1 October 2013). According to the New START Treaty required biennial data exchange, as of 1 October 2013 the United States had 1,688 nuclear warheads deployed on a mix of ICBMs and SLBMs and attributed to unarmed heavy bombers. A total of 1,015 deployed and non-deployed ICBM and SLBM launchers and deployed and non-deployed heavy bombers were maintained by the United States.

6. Statement of Rear Admiral Terry Benedict, Director of Strategic Systems Programs, before the Subcommittee on Strategic Forces of the Senate Armed Services Committee, 17 April 2013, 2.

7. Amy F. Woolf, *U.S. Strategic Nuclear Forces: Background, Developments, and Issues.* (Washington, DC: Congressional Research Service, 22 October 2013), 8, 16. Each Trident II is capable of carrying up to 8 MIRVs, depending on the type of warhead loaded. Either the W-76 or heavier W-88 can be loaded on the Trident II SLBM.

8. Michael J. Dobbs, "The Incredible Shrinking SSBN(X)," *US Naval Institute Proceedings,* vol. 138, issue 6, Jun 2012, 1.

9. Woolf, 19.

10. Robert S. Norris and Hans M. Kristensen, "U.S. Nuclear Forces, 2006," *Bulletin of the Atomic Scientists*, vol. 62, no. 1, January 2006, 68-71. According to Rear Admiral Charles B. Young, USN Strategic Systems program director, the increased number of Ohio-class SSBNs and Trident II D-5 "enhances system accuracy, payload, and hard-target capability, thus improving [U.S.] available responses to existing and emerging Pacific theater threats."

11 . Ronald O'Rourke, *Navy Ohio Replacement (SSBN[X]) Ballistic Missile Submarine Program: Background and Issues for Congress.* (Washington, DC: Congressional Research Service, 14 March 2013), 2. The 18 original Ohio-class SSBNs were fielded with 30-year service lives.

12. Benedict, 4. Original Trident II D-5 service life was 25 years. It was extended to 50 years, double the service life of any previous sea-based deterrent system.

13. Christopher J. Castelli, "Navy Confronts $80 Billion Cost Of New Ballistic Missile Submarines," *Inside the Navy*, Public Articles vol. 22. No. 48, 7 December 2009, On-line, Internet, available from insidedefense.com/200912071825134/Inside-Defense-General/Public-Articles/navy-confronts-80-billion-cost-of-new-ballistic-missile-submarines.html.

14. . Congressional Budget Office, *An Analysis of the Navy's Fiscal Year 2014 Shipbuilding Plan.* (Washington, DC: Congressional Budget Office, October 2013).

15. O'Rourke, 10-12.

16. Michael Fabey, "US Navy Defends Boomer Submarine Replacement Plans," *Aviation Week's DTI,* 28 September 2012, On-line, Internet, available from www.military.com/daily-news/2012/09/28/us-navy-defends-boomer-submarine-replacement-plans.html.

17. Association of the United States Navy, "Ohio Class Replacement Submarine Program (SSBN(X))," *2012 Fact Sheet,* On-line, Internet, available from www.ausn.org/Portals/0/pdfs/fact-sheets/Ohio%20Class%20Replacement%20Submarine%20Program%20(SSBN(X))%202012%20Fact%20Sheet.pdf.

18. O'Rourke, 12.

19. Kris Osborn, "Admiral: Navy Must Shrink Submarine Development Costs," *DoD Buzz Online Defense and Acquisition Journal*, 27 September 2013, On-line, Internet, available from www.dodbuzz.com/2013/09/27/admiral-navy-must-shrink-submarine-development-costs/.

20. Rick Rozoff, "Prompt Global Strike: World Military Superiority Without Nuclear Weapons," *Global Research*, 11 April 2010, On-line, Internet, available from www.globalresearch.ca/america-s-imperial-design-prompt-global-strike-world-military-superiority-without-nuclear-weapons.

21. Richard Smoke, *National Security and the Nuclear Dilemma: An Introduction to the American Experience in the Cold War.* (New York: McGraw Hill, Inc. 1993), 91.

22. Ben McGrath, "Countering the Pentagon's 'Pivot to Asia': China and Russia hold War Games in Sea of Japan," *Global Research*, 16 July 2013, On-line, Internet, available from www.globalresearch.ca/countering-the-us-pivot-to-asia-china-and-russia-hold-war-games-in-sea-of-japan/5342881.

23. . Kenneth N. Waltz, "Nuclear Myths and Political Realities," *The American Political Science Review*, vol. 84, no. 3, September 1990, 738.

24. Paul K. Davis, *Studying First-Strike Stability with Knowledge Based Models of Human Decision-making.* (Santa Monica, CA: RAND Corporation, April 1989), 15.

25. Thomas C. Schelling, *Arms and Influence.* (New Haven, CT: Yale University Press, 2008), 246.

26. Lawrence Freedman, *Deterrence.* (Malden, MA: Polity Press, 2004), 36-37.

27. Bryan McGrath, "SSBN(X) as Great White Whale," *Information Dissemination*, 19 September 2013, On-line, Internet, available from www.informationdissemination.net/2013/09/ssbnx-as-great-white-whale.html.

28. . Congressional Budget Office, *An Analysis of the Navy's Fiscal Year 2014 Shipbuilding Plan.*14. This amount is normalized to 2013 dollar values and includes
$19.3B in new-ship construction, $1.1B in nuclear power plant refueling, and $900M in other annual related costs.

29. Ibid, 12. The Navy's 2014 30-year shipbuilding goal is to increase the total battle force fleet from 285 ships at the end of 2013 to 306 ships. From 1984 to 2013, the Navy received approximately $14 billion (2013 dollars) annually for shipbuilding. The Navy breaks down 30-year cost plans into near, mid, and long-term, each 10 years in length with increasing variation and uncertainty in the later decades.

30. Congressional Budget Office, *An Analysis of the Navy's Fiscal Year 2014 Shipbuilding Plan.*

31. Ibid, 24.

32. Congressional Budget Office, *An Analysis of the Navy's Fiscal Year 2014 Shipbuilding Plan.* The Navy does not plan to build more cruise missile submarines (SSGNs); the four Ohio-class SSGNs are expected to remain in service through mid-2020s.

33. Benedict, 6.

34. Sydney J. Freedberg, Jr., "Sen. McCain Slams $2.5B Carrier Cost Increase; Navy Struggles to Fund SSBN-X, Destroyers," *Breaking Defense*, 8 May 2013, On-line, Internet, available from breakingdefense.com/2013/05/sen-mccain-slams-2-5b-carrier-cost-increase-navy-struggles-to-fund-ssbn-x-destroyers/.

35. Congressional Budget Office, *Long-Term Implications of the 2014 Future Years Defense Program.* (Washington, DC: Congressional Budget Office, November 2013), 14.

36. Ibid, 33.

37. Congressional Budget Office, *Long-Term Implications of the 2014 Future Years Defense Program.*

38. James M. Acton, "Managing Vulnerability, Second Strike: Is the U.S. Nuclear Arsenal Outmoded?", *Foreign Affairs*, March/April 2010, On-line, Internet, available from www.foreignaffairs.com/articles/65993/jan-lodal-james-m-acton-hans-m-kristensen-matthew-mckinzie-and-i/second-strike.

39 . William Rosenau, *Special Operations Forces and Elusive Enemy Ground Targets: Lessons from Vietnam and the Persian Gulf War.* (Santa Monica, CA: RAND Corporation, 2001), 33. Coalition forces resorted to loitering over the expected deployment area with the aim of destroying launchers after the missiles had been fired.

40. . Woolf, 8. Under New START limits, the United States will deploy 1,090 warheads in 14 SSBNs. With two boats undergoing maintenance and half of the remaining twelve on normal patrol, approximately 467 warheads are available for attack (1090 / 14 x 6 = ~467).

41. Robert D. Critchlow, *Nuclear Command and Control: Current Programs and Issues.* (Washington, DC: Congressional Research Service, 3 May 2006), 19. PALs employ physical and electronic combination locking systems that prevent unauthorized access to nuclear weapons. Unlock codes are only able to be released when launch orders are issued by the President.

42 . Department of Defense, *JP 3-12: Doctrine for Joint Nuclear Operations*, (Washington, DC: Pentagon, 15 March 2005), II-1.

43. . Adam Ciralsky, "Will It Fly?", *Vanity Fair*, 16 September 2013, On-line, Internet, available from www.vanityfair.com/politics/2013/09/joint-strike-fighter- lockheed-martin. For example, the most expensive weapon system in American history, the Air Force's F-35 Joint Strike Fighter, is estimated to cost $1.5 trillion over the program's life. The original contract estimated the cost at $233 billion for 2,852 airframes. According to the GAO, per-plane cost has doubled from $81 million to $161 million. Continued cost overruns may lead to pressure to cut the number of airframes produced, leading to a program death spiral. Political engineering of the production process by including manufacturing in 46 States insulates Congressional oversight and constrains program criticism.

44. Department of Defense, *Nuclear Posture Review Report*, 28.

45. Department of Defense, *JP 3-12*, II-11.

46. Donald H. Rumsfeld, Secretary of Defense, *Nuclear Posture Review Report Forward*, January 2002, On-line, Internet, available from www.defense.gov/news/ jan2002/d20020109npr.pdf.

47. Department of Defense, *Nuclear Posture Review [Excerpts]*, 8 January 2002, On-line, Internet, available from www.stanford.edu/class/polisci211z/2.6/ NPR2001leaked.pdf.

48. Amy F. Woolf, *Conventional Warheads for Long-Range Ballistic Missiles: Background and Issues for Congress.* (Washington, DC: Congressional Research Service, 26 January 2009), 7.

49. Woolf, *Conventional Warheads*, 8.

50. Dinshaw Mistry, Austin Long, and Bruce M. Sugden, "Going Nowhere Fast: Assessing Concerns about Long-Range Conventional Ballistic Missiles," *International Security*, vol. 34(4), 2010, 169. Rapidly-emerging precision global strike targeting must have accurate and actionable intelligence to support employment of CBMs against the time-sensitive, pop-up threats envisioned by CBM proponents. This intelligence must be precise, reliable, timely, and comprehensive in order to justify the employment of long-range strategic conventional missiles. Forward-deployed airborne and ground-based gathering assets will be required to produce actionable targeting information. However, given the limited size and nature of these forces, they may not have the strike capability to adequately engage emerging targets, or by doing so will compromise their continued collecting viability.

51. Ibid., 171. Opponents of CBM development argue that extended lead times required for high-fidelity CBM targeting intelligence would allow other conventional forces, such as manned stealth bombers, conventional cruise missiles, unmanned aerial vehicles, or special operations forces, to deploy in order to engage emerging targets. Additionally, near-term targeting must have accurate and actionable intelligence to support employment of CBMs against the time-sensitive, pop-up threats envisioned by CBM proponents. This intelligence must be precise, reliable, timely, and comprehensive in order to justify the employment of long-range strategic conventional missiles.

52. Department of Defense, *JP 3-12*, II-11.

53. M. Elaine Bunn and Vincent A. Manzo, "Conventional Prompt Global Strike: Strategic Asset or Unusable Liability?", *National Defense University: Strategic Forum*, SF no. 263, February 2011, On-line, Internet, available from csis.org/files/media/csis/pubs/110201_manzo_sf_263.pdf, 2.

54. Jeff Richardson, "Shifting from a Nuclear Triad to a Nuclear Dyad," *Bulletin of Atomic Scientists*, vol. 65, no. 5, September/October 2009, 1. Eventually, the triad as currently constructed will no longer be viable as critical mass and economy of force is insufficient to sustain the capability. Re-posturing as a dyad or monad will require flexible and tailorable delivery methods.

CHAPTER 6

Credibility of United States Extended Nuclear Deterrence for Northeast Asia

Steven D. Carroll

The New START Treaty approved by the United States and Russia requires both countries to reduce the number of operational nuclear warheads to 1,550 by the year 2018.[1] It does not prevent either country from going below that number if desired. In his April 2009 Prague speech, President Obama said, "… I state clearly and with conviction America's commitment to seek the peace and security of a world without nuclear weapons."[2] Supporters of Global Zero praise this statement, and those opposed to reducing the number of nuclear weapons point to it as the President's failure to adequately defend this nation and its allies.

In June 2013, President Obama stated, "… After a comprehensive review, I've determined that we can ensure the security of America and our allies, and maintain a strong and credible strategic deterrent while reducing our deployed strategic nuclear weapons by up to one-third."[3] A one-third reduction from 1,550 puts the U.S. nuclear arsenal at about 1,000 warheads. As the President lowers the number of operational warheads, the question must be asked: how will this affect the countries currently under U.S. extended nuclear deterrence, particularly our allies in Northeast Asia?

Aside from war itself, deterrence remains the most studied concept in the history of modern strategic thought.[4] Perhaps Lawrence Freedman best explains the concept in his book, *Deterrence*, where he uses the Roman motto of *Si vis pacem, para bellum* ("If you wish for peace, prepare for war"). [5] For the purpose of this paper, extended nuclear deterrence is defined as the United States extending its nuclear capabilities to defend non-nuclear weapon states. Examples of this "nuclear umbrella"

include the 25 non-nuclear NATO member states, Japan, South Korea, and Australia.[6] The United States originally used extended nuclear deterrence with NATO to protect Western Europe from Soviet Union expansion. Later, the United States provided extended nuclear deterrence to discourage nations from developing their own nuclear arsenals.

The focus of this paper is the credibility of U.S. extended nuclear deterrence for Northeast Asia, for it is there that all the elements for potential confrontation exist: land disputes with huge reserves of natural resources at stake, potential changes to national boundaries and shipping lanes, an aspiring hegemon, and, arguably, irrational players. These are all ingredients for tension, escalation, and armed conflict.

This paper will be divided into three sections. Initially, there is an appraisal of the current situations facing Japan and South Korea – external situations and ongoing conflicts – then an examination of each country's current view of nuclear weapons and how it relates to the United States and extended nuclear deterrence. The second section will look at five credibility arguments for why extended nuclear deterrence does or does not work. Finally, there will be recommendations that the United States should consider with respect to Japan and South Korea.

Current Northeast Asia Situation

U.S.-Japan and U.S.-South Korea

The current situation in Northeast Asia is one of increasing escalation. There are five major players in the area: China, Japan, North Korea, South Korea, and the United States. Of these countries, two potential U.S. adversaries, China and North Korea, have nuclear capability. China has approximately 250 nuclear weapons, while North Korea has the ability to produce as many as 6 possible warheads, with the U.S. reducing total operational warheads to 1,550 by 2018.[7, 8] The United States has bilateral security agreements with Japan and South Korea, and these security agreements have no doubt influenced the lack of nuclear weapons development in those countries. If Japan or South Korea were attacked, the United States would be required to defend those nations. For this reason, Japan and South Korea are extremely reliant upon the United States as part of their defense strategy.

Japan

Japan is currently involved in a dispute with China over the contested Senkaku/Diaoyu Islands (called Senkaku by Japan, Diaoyu by China). On 23 November 2013, China declared an ADIZ over the islands, escalating the tensions in the area. Since China's declaration, the United States, Japan, and South Korea have all flown military aircraft in the area in defiance of the Chinese ADIZ. China responded by sending their only aircraft carrier to the region and conducting 'monitoring' flights with their air force.[9] The conflict is not about the island land mass but rather the shipping lanes, country boundaries, and potential oil reserves. China is growing both economically and militarily and presents a threat to Japan's interests.

Japanese law prohibits nuclear weapons on its soil and on any ships sailing in its territorial waters. The current political leadership and population do not support nuclear weapons in their country. In fact, in September 2013, Japan shut down all of its nuclear reactors because of problems with the Fukushima reactors from the tsunami of 2011.[10]

South Korea

Since President George H.W. Bush ordered the removal of all U.S. nuclear weapons from South Korea in 1991, the situation there has changed significantly.[11] North Korea conducted its first nuclear test in 2006, and, despite U.S. sanctions against it, it has conducted additional nuclear tests and has improved its missile capabilities. In March 2010, North Korea sank a South Korean ship, killing 46 sailors, and in November 2010, initiated artillery fire on a small, isolated island, killing two soldiers and two civilians.[12] In early 2013, the North conducted a third nuclear test and said it would make the South a wasteland. A poll taken in February 2013 showed, "two-thirds of South Koreans believe that their country should acquire nuclear weapons, something the U.S. does not support and would certainly find destabilizing and counter to its intentions to pursue further nuclear reductions."[13] In March 2013, the United States had nuclear-capable bombers (B-2s and B-52s) fly over Seoul to send a message of support for the South and U.S. resolve to the North.[14] By April 2013, the United States and South Korea agreed to a "proportional"

response if North Korea commits an aggressive engagement against the South.[15] Recent reports indicate that North Korea has once again started activity at its nuclear testing site.[16] The current political leadership of South Korea maintains that it does not want nuclear weapons in its country.

Credibility Arguments for Extended Nuclear Deterrence

The extended nuclear deterrence debate rests on credibility; it is the foundation upon which other arguments can be deliberated and is the very core of extended nuclear deterrence. As Patrick Morgan defines it, "Credibility is the quality of being believed."[17] For a nation to be credible, it must possess both capability and will. Without the capability to act, and without the will to endure, there is no credibility.

There are many factors that can affect U.S. credibility; however, this paper will focus on five arguments: the exchange argument ("Seattle for Seoul"); failure of the United States to modernize its nuclear arsenal; reduction in the number of U.S. warheads; failure of nuclear weapons to prevent war; and the failure of nuclear deterrence to prevent proliferation.

The Exchange Argument

Would the United States risk a nuclear attack on its soil to defend another nation? This is the heart of the exchange argument. Most scholars agree that a nuclear attack against U.S. soil would require the United States to retaliate with a nuclear strike against the attacking nation. Whether the attack was from Russia, China, or North Korea, the United States would have to respond.

The greatest concern from countries under U.S. extended nuclear deterrence is whether or not the United States would risk a nuclear war to defend them. Would the United States use nuclear weapons on North Korea if North Korea attacked Seoul with a nuclear weapon? Would the United States attack China with nuclear weapons if China destroyed Tokyo or Seoul with a nuclear bomb? Not only does China have abundant nuclear warheads, but it also has the capability to strike the United States with those weapons. Many critics say the answer is "no," the United States will not risk a nuclear war to defend Japan or South Korea.

Critics argue that it is illogical that any U.S. President, despite any treaty or agreement, would risk the lives of millions of Americans, or perhaps the entire country itself, to defend another nation from nuclear attack. This is why critics believe that extended nuclear deterrence is not credible. They think the United States would never risk annihilation for Japan or South Korea. A case for proof is France. Despite being a close ally and under U.S. extended nuclear deterrence, France sought out nuclear weapons because it did not think that the United States would sacrifice New York for Paris.

Critics can argue that credible nuclear deterrence does not work, but the facts do not support their views. Every day for 65 years, U.S. nuclear weapons have deterred nuclear attacks against the United States and its allies. Extended nuclear deterrence has worked 100% of the time. Credibility of this policy lies partly in not using the weapons. If China detained a Japanese citizen, it would not be credible to think that the United States would launch a nuclear attack against China. If China sank a Japanese boat, it still would not be credible for the United States to launch a nuclear attack against China. China conducts cyber-attacks against the United States every day; it would not be credible for the United States to launch a nuclear attack against China in response to the cyber-attacks. Because nuclear weapons are so destructive, the rational, credible part of extended nuclear deterrence would be for use if an ally is attacked by nuclear weapons or was existentially threatened by another country. This implied credibility is the reason why North Korea only threatens South Korea and does not act. North Korean leadership knows that the United States is not going to drop a nuclear warhead on the North for rhetoric or, as in the past, for small, armed conflict with the South.

As mentioned, critics believe that extended nuclear deterrence does not work because, logically, the United States would not trade city for city. This logic is precisely why it does work. James Acton wrote, “Just as a U.S. president would not want to sacrifice New York in the defense of Tokyo, so too the Chinese leadership would not be willing to risk Beijing to acquire it. This promotes the same extreme caution in Chinese decision making contemplating an action that might incur a nuclear response as it does in their American counterparts.”[18] The Cuban Missile Crisis further supports this logic. While both the United States and Soviet Union pushed conflict to the brink, the reality was that Cuba was not worth Washington

or Moscow, and for this very reason, a settlement between the two nations was reached. Just as it is illogical for the United States to risk a nuclear war, China would not risk one either.

Many scholars have also used an empirical approach to establish that credibility does exist and can be predicted. Paul Huth and Bruce Russett studied 54 cases of extended deterrence from 1900 to 1980 and found "a majority (78 percent) of the outcomes are correctly predicted by the model. No model can explain every case, or with the simple prediction that deterrence will always work. (It did in 57 percent of the cases)."[19] They further concluded that the three factors that made a defender's credibility successful were economic linkage (foreign trade), arms transfers, and military local balance.[20] As they stated in their conclusion, "we found that in our sample success was most often associated with close economic and political-military ties between the defender and its protégé. Local military superiority for the defender and its protégé helped bolster the deterrence."[21]

Researcher Vesna Danilovic used cases from 1895 to 1985 but added a regional interest as an element for the defender and developed five components to make extended deterrence credible. They were: regional alliance/bonds, diplomatic exchanges (number of diplomatic missions), past defender behavior in region, costly signal (before outbreak of war, did defender mobilize forces or give verbal statements?), and regional foreign trade. "At the least, the evidence for regional salience (bonds) in deterrence relations clearly supports the general argument from the quantitative deterrence literature that the issues at stake matter most."[22]

Yet another empirical model was developed by Curtis Signorino and Ahmer Tara. In their research, they found military alliance, foreign trade, military arms transfers, long-term balance of forces, and defender possession of nuclear weapons as key indicators for deterrence predictability and success. [23] Colonel William G. Eldridge's research summarizes these surveys and illustrates the elements that predict credibility (see Table 1). Summarizing the three empirical studies, it has been statistically shown that countries will risk exchange of cities to defend an ally and, therefore, the credibility of extended deterrence may depend more on the defender-ally relationship then the strength of the defender's military or nuclear forces. All three studies found that foreign trade is a key element of credibility. The more a defender is tied to a

protégé (trade, alliances, and military transfers), the more credible the deterrence.

Researcher	Huth and Russett	Danilovic	Signorino and Ahmer
Elements	Foreign trade	Regional foreign trade	Foreign trade
	Arms transfers	Past defender behavior in region/costly signals	Military alliance
			Military arms transfers
	Local military balance	Regional alliance bonds/diplomatic exchanges	Long-term balance of forces
			Defender possesses nuclear weapons

Table 1: Elements of Credibility for Extended Deterrence

Failure of the United States to Modernize Its Nuclear Arsenal

With Global Zero gaining attention, many believe that the United States should look at reducing budgets for nuclear programs. In reality, just the opposite needs to occur. When the United States halted nuclear testing in 1992, it also stopped modernizing its weapons. Since then, it has shut down many production facilities, inhibiting advances in capability, safety, security, reliability, and adaptability.[24] U.S. nuclear weapons were not designed for an indefinite stockpile life, and the impacts of aging on the weapons are uncertain.[25] In 1998, the average age of U.S. nuclear warheads was fourteen years old; today it is nearly thirty.[26] Failure to modernize the nuclear arsenal decreases our ability to adapt to changes in the threat environment and national strategy, and it increases collateral damage in a potential conflict. It may also send signals to potential adversaries that U.S. resolve is weak, its capability is poor, and that the United States has no will to use nuclear weapons, thus reducing credibility.

One of the indirect effects of failing to modernize is the loss of human capital experience in building and testing nuclear weapons. The last U.S. nuclear weapon test was in 1992. Most people involved with those tests are now retired; the few remaining will retire soon. The U.S.

has skipped a generation developing scholars and leaders with an understanding of nuclear weapons. "The combination of an aging nuclear arsenal and the complexity of nuclear weapons and their subsystems will make it difficult to certify them until infinity. This adversely affects the knowledge of weapons reliability and denies a sensible and reliable means to test new nuclear weapons capabilities – all eroding credibility."[27]

There is no logical counter to the argument that failing to modernize the nuclear arsenal can reduce credibility. The United States refurbishes aging warheads; however, this process does not improve the warhead. To illustrate this better, think of the first personal computers made as the aging warheads. The first computers had five-inch floppy drives and very little memory, and they operated slowly. If the floppy drive broke, you had to find and replace it with an old but operational floppy drive instead of a new and more advanced DVD drive. The United States should modernize, and refurbishing is not the solution. With modernization comes the need to test new devices. A benefit of testing and developing new nuclear warheads is that the United States can replace high-yield warheads with lower yields, which ultimately boosts credibility as warheads could be better employed against military targets and reduce collateral damage against civilian populations. New warheads will improve capabilities and limit collateral damage. The United States should resume testing and modernize its warheads to reinforce nuclear deterrence. Failure to do so may send signals to adversaries that the United States does not have the will to use nuclear weapons.

Reduction in the Number of U.S. Warheads

Many argue that the United States still has too many warheads, while others believe it has too few. U.S. warhead levels have been dramatically reduced from 12,000 deployed weapons in 1981 to around 2,200 in 2009, while the New START Treaty requires reduction of warheads to 1,550 by 2018. [28] President Obama wants to unilaterally reduce that number to roughly 1,000. Many in Japan do not see the reduction of U.S. nuclear weapons as a problem, as many in Japan have a vision of a world with no nuclear weapons. Many would like to see the United States reduce further. "Obama's speech [Prague] was well received in Japan, which should come as no surprise because it echoed the

country's longtime diplomatic ambition to move toward a nuclear free world." [29] Two weeks after Obama's speech, then-Foreign Minister Hirafumi Nakasone announced an eleven-point plan for global disarmament that emphasized the peaceful uses of nuclear energy and nonproliferation.[30] There is no set number of warheads required to deter an adversary. There is no correlation that a higher the number of warheads yields a higher level of deterrence. Reductions in inventory will save maintenance costs and still provide extended nuclear deterrence.

Dr. S. Paul Kapur, professor in the Department of National Security Affairs at the U.S. Naval Postgraduate School and a faculty affiliate at the Center for International Security and Cooperation, disagrees with the reduction. He writes that the danger in reducing the number of U.S. nuclear warheads is that it could lead to many unpredictable direct and indirect effects, as well as formal and informal deterrence.[31] He writes that direct effects could lead a state to change its security position to a more relaxed posture and reduce arsenal size, or it could take a more ambitious posture and increase arsenal size.[32] For example, when nuclear weapons were removed from South Korea, North Korea began moving towards proliferation. Indirect effects could impact the behavior of a third state in terms of its change in posture (relaxed or ambitious) based on the second state's actions. [33] Formal deterrence of reducing U.S. warheads could be that the United States eventually decides to eliminate extended nuclear deterrence to South Korea. With informal deterrence, South Korea loses faith in the United States' ability to provide extended nuclear deterrence (due to smaller numbers) and decides to move towards proliferation.[34]

In 2010, The Brookings Institution wrote, "If cuts in the number of American warheads went too low, Japanese realists worry that there would not be enough to credibly maintain deterrence, but they have different views on where the lower limit is. One expert estimates that 1,500 is about the lower limit; others say that anxiety would increase significantly if the U.S. nuclear force dropped beneath 1,000 deployable weapons."[35]

The danger of reducing the number of U.S. warheads is that no one knows what number is too low, both for an adversary or protégé, and by doing so unilaterally, the U.S. decision could cause further instability in the region or trigger unpredicted effects.

Failure of Nuclear Weapons to Prevent Wars

Since the United States dropped two atomic bombs on Japan, it has been in five major wars: Korea, Vietnam, Iraq (1991), Afghanistan, and Iraq (2003). It has also been involved in several conflicts (e.g., Panama, Grenada, and the Balkans). Clearly, nuclear weapons do not deter those without nuclear weapons from fighting those who do. If nuclear weapons have not kept the United States from war, extended deterrence will not keep others from war. Why do nuclear weapons not deter? Ward Wilson, Senior Fellow for the James Martin Center for Nonproliferation Studies, Monterey Institute of International Studies, wrote that nuclear weapons are not very useful because they are only suited for killing civilians en masse.[36] Most would consider killing the masses politically unpopular; in addition, nuclear weapons are useless against terrorist organizations that operate within the borders of nation states. On the other end of the spectrum, nuclear weapons do not necessarily deter other nuclear countries from fighting each other. In 1969, Russia and China had border conflicts that killed nearly 200 soldiers. Nuclear weapons did not deter any of the above mentioned wars, conflicts, or fighting from taking place.

Nuclear weapons do not prevent conflict; they prevent nuclear wars, and they signal an adversary that total defeat of the attacked country will cost the attacker total defeat as well. Nuclear weapons are not weapons of war; they are weapons of total destruction. You would not use a nuclear weapon to destroy five tanks or 500 soldiers. There have been small conflicts between nuclear powers, some without fatalities (Cuban Missile Crisis) and some with fatalities (China-Russian border conflict).[37]

Nuclear weapons are too absolute in death and destruction to use as an instrument of war, and all who possess them realize this. To say that nuclear weapons do not prevent wars seems preposterous. Nuclear weapons have prevented wars; the same cannot be said for conventional weapons. Since 1945, not one person has been killed by a nuclear weapon, while estimates of human lives lost to conventional wars since 1945 are around 51 million people.[38]

Failure of Nuclear Deterrence to Prevent Proliferation

One of the hottest debates on television and radio talk shows is U.S. policy towards states acquiring nuclear weapons. Many have argued that extended nuclear deterrence does not work, because it has not prevented proliferation. These critics point at North Korea as an example. Martin Indyk, Vice President and Director, Foreign Policy, for The Brookings Institution, pointed out that the credibility of America's commitment is undermined by our inability to deal with the proliferation threat from North Korea. [39] However, associating credibility and U.S. commitment to a county's proliferation is incorrect. Possessing nuclear weapons does not necessarily cause proliferation, nor does it prevent proliferation. In fact, as both the United States and Russia decrease their nuclear arsenals, other countries are increasing theirs. And the opposite is true as well. At the height in numbers of U.S. and Russian warheads, other countries were developing their own arsenals.

U.S. nuclear deterrence was designed to keep the Soviet Union from invading Western Europe, as the Soviet Union greatly outnumbered the Western powers in manpower and equipment. The sole purpose of U.S. nuclear weapons was to deter an attack, not to deter the Soviet Union from proliferation. The last time a U.S. President wanted to keep a country from acquiring nuclear capability, the U.S. invaded Iraq. Nuclear deterrence is not designed to prevent proliferation; it is designed to deter those who have nuclear weapons from using them.

Recommendations

South Korea

In April 2013, South Korean Prime Minister Chung Hong-won reiterated Seoul's commitments to a denuclearized Korean peninsula.[40] However, population polls do not necessarily agree with this policy. Chung Maong-joon, a son of the founder of the Hyundai industrial group and a former leader of the governing party, argued that the United States should reintroduce tactical nuclear weapons to the Korean peninsula as a deterrent.[41] The United States should develop a tailored defense for South Korea. Within this tailored extended nuclear deterrence, the United States

should re-introduce nuclear weapons to South Korean soil. Critics will say that this act would induce North Korea to increase its nuclear arsenal. The North has aggressively pursued nuclear weapons, even though there are not any nuclear weapons in the South. Non-proliferation has failed as a policy.

Rearming the peninsula should be a planned, phased approach, with the intent to push North Korea into a verifiable non-proliferation state. The ultimate goal is to make the Korean peninsula a nuclear free zone and, in order to be effective, the plan must include China. Cheon Seongwhun, senior researcher for the Korea Institute for National Unification, proposes building a Korean Peninsula Tailored Deterrence architecture that includes the presence of American tactical nuclear weapons in South Korean territory.[42] "Being faithful to the core concept of the regionally tailored deterrence architecture, there is no other place in the world except South Korea that deserves first-hand access to the U.S. extended nuclear deterrence."[43] Figure 1 shows a recommendation on how the United States and South Korea could reintroduce nuclear weapons into the peninsula. It combines Seongwhum's tailored approach but leverages China's desire to be a world leader. The United States should publicly recognize China's role in the region and pressure China to lead denuclearization talks with Pyongyang. This approach incentivizes China as the lead negotiator and gives it world recognition as a major player in the region. If China fails to lead or negotiate denuclearization, then the United States should reintroduce nuclear weapons in the South.

Japan

Japan remains the only country to have ever had nuclear bombs dropped on its soil in an act of war. While those two events happened almost seventy years ago, the sting and pain of the horrible destruction that took place in August 1945 are still etched in the memory of both old and young Japanese. No country knows more about nuclear devastation than Japan.

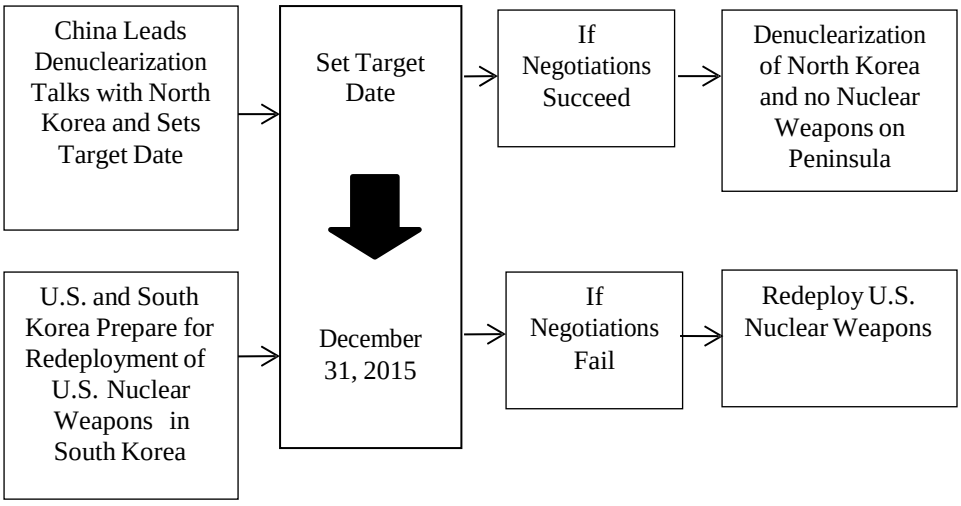

Figure 1.

The political will of the Japanese people is strongly set against nuclear weapons. Numerous surveys have reinforced Japan's desire to avoid proliferation. While political discourse about nuclear weapons is no longer political suicide, the Japanese public remains averse to nuclear weapons and their use, and the government remains unwilling to change on nuclear doctrinal norms and prohibitions.[44] Current president of the Japan Institute of International Affairs and former Japanese Ambassador Yukio Satoh stated, "… the Japanese have come to realize anew the importance of American deterrence for their security and this has made the Japanese more sensitive than ever to Washington's attitude to North Korea."[45]

Japan should follow the status quo for two reasons. China is not a nuclear threat to Japan, and the will of the Japanese people is not strong enough to support the thought of nuclear weapons on their soil. While there are potential escalation issues with island disputes that could produce a limited armed conflict, it is not great enough for China to use nuclear weapons.

Japan should continue its current policy of nonproliferation. Several studies show strongly that the desire of the Japanese people is to remain nuclear free. Llewelyn Hughes of the Elliot School of International

Affairs wrote, "[t]hey concluded, however, that strengthening the status quo was both optimal and possible, and the strategy that has emerged from this has proven an unbridled success. While guaranteeing the continued efficacy of nonproliferation and arms control regimes is outside Tokyo's control, incremental increases in the Self-Defense Forces' roles and mission have ensured that Japanese political actors and organizations remain confident in the U.S. commitment to deter conventional and nuclear threats to Japan."[46]

Japan and the United States should continue their discussions on strategic nuclear policies. Japan was able to share its views and voice opinions that were represented in the NPR. Japanese officials applauded U.S. readiness to hear their opinions and conceded that they had "unprecedented" input into the drafting process.[47] The United States and Japan should continue this path of cooperation.

United States

As the United States shifts focus to Asia, it must also shift the way it develops nuclear posture and policy. With the ever-changing landscape of economic and military states, the United States should adopt a more flexible strategy. The United States should include the Japanese and South Korean governments when developing NPRs. The United States can develop an extended nuclear deterrence policy that is specific to Japan and South Korea and achieve a bilateral tailored defense.

South Korea has an immediate threat of invasion on its border, Japan does not. The chances of escalation and potential nuclear war are different for South Korea than for Japan. Therefore, the extended nuclear deterrence for each country should be developed together, not only to understand the parameters of extended nuclear deterrence, but to establish steps at reinforcing credibility. This idea is supported by others. James Acton stated, "A strategy for communicating resolve needs to be tailored to each ally and should be developed in consultation with regional specialists who understand how to make demonstrations of U.S. resolve persuasive."[48] Koji Tomita from the Embassy of Japan to the United States stated, "… extended nuclear deterrence needs to cater to vast scenarios and varying degrees of escalation from lower intensity to higher intensity. And we need a toolkit to respond to all these complex challenges."[49]

The United States must continue to have strong relations with Japan and South Korea. Alliance building and assurance activities remain important. Integrating allies into the formal consultative process will have the additional benefit of providing a form of reassurance and will reinforce credibility in the eyes of an adversary. "In the absence of such consultations, U.S. policies intended to strengthen deterrence may actually hasten its failure. The consequences of such could be unprecedented and catastrophic for all."[50]

Finally, the United States should gain a better understanding of the China-North Korea relationship. Paul Saunders of the Center for the National Interest wrote, "For the U.S. to forge a trilateral relationship with Tokyo and Seoul, it will be necessary to assess whether China and North Korea are one problem or two. The answer to this question will shape U.S. strategy in approaching these two critical allies."[51] The key to a nuclear-free Korean peninsula is through China, and the United States should work with it as an equal partner.

Summary

In his paper *Extended Nuclear Deterrence in East Asia*, Andrew O'Neil wrote, "in order for extended nuclear deterrence to be credible, the U.S. must continue to show assurance to that nation and to the world. American decision makers must be willing to deliver on their commitments, even at the risk of incurring a strike on the U.S. homeland; allies need to be reasonably confident this will occur; and adversaries need to have sufficient belief that the U.S. will honor its commitments."[52]

U.S. extended nuclear deterrence is very credible. However, that credibility is at risk unless the United States resumes nuclear testing and begins to modernize its arsenal. This will make the weapons safer and more effective. This will also allow the United States to generate nuclear scientists for the future. Additionally, the United States should stop reducing the nuclear arsenal unilaterally. If future U.S. Presidents want to move to Global Zero, they must do it in unison with all countries that possess nuclear weapons, and there must be a very strong verification process to prevent other countries from proliferation in the future.

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CHAPTER 7

Does One Size Fit All?

Paul D. Schumacher

The U.S. Department of Defense currently defines deterrence as, "The prevention of action by the existence of a credible threat of unacceptable counteraction and/or belief that the cost of action outweighs the perceived benefits."[1] While this definition provides a current baseline for the United States to understand deterrence, the concept of deterrence possesses a longer history. The Roman motto of *Si vis pacem, para bellum* ("If you wish for peace, prepare for war") highlights one early state's use of military threats to coerce other nations' behavior.[2] Not only states but individuals as well use the concept of deterrence on a daily basis. Almost every parent engages in the full spectrum of deterrence at some point when raising their children via rewards and threats to coerce desired or prohibit undesired behavior.

With the detonation of two atomic bombs over Japan in August 1945 and the Soviet Union testing an atomic bomb in 1949, the academic field of nuclear deterrence began. Within the new field, two theorists gained early prominence. Nobel laureate Thomas Schelling and Herman Kahn developed different analytical frameworks regarding rational adversary behavior during the Cold War.[3] Schelling proposed a stable balance of terror focused on mutually assured destruction with the element of chance.[4] Kahn emphasized an asymmetric balance of terror in favor of the United States and emphasized defensive efforts.[5] Both theories focused on the ability of rational actors to deduce the inner workings of deterrence. While the overall concept of deterrence, per the DOD definition of manipulating behavior via threats, appears straightforward, the actual process of deterrence involves highly complex, mental mechanisms and a variety of situational factors. The salient point for both theories concerns

their development in a timeframe where the dominant feature of the international strategic environment was a bipolar adversarial relationship between the nuclear-armed countries of the United States and the Soviet Union. The current strategic environment no longer fits this bipolar description.

With the end of the Cold War, the bipolar, adversarial relationship dissolved. The strategic environment that emerged looks markedly different and more complex, with nine nuclear weapon states in addition to rogue states and violent non-state actors exploiting the proliferation of weapon technology.[6] To properly elucidate the growth in complexity, Figure 1 and Figure 2 are approximate depictions of the nuclear strategic environment during the Cold War and today.

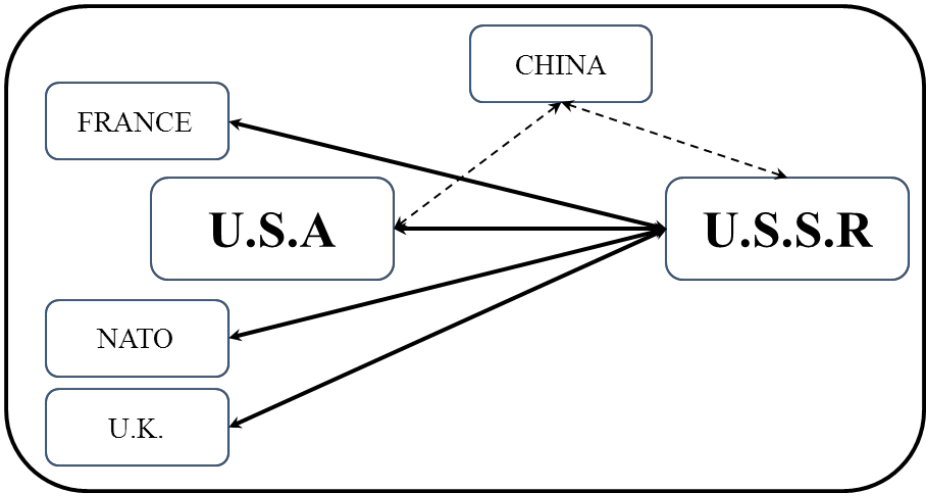

Figure 1. Graphic Representation of the Cold War Nuclear Security Environment through the early 1970's. Solid line represents primary deterrence effort. Positioning represents alliance.

Clearly, the increase in the number of actors, all with different cultural backgrounds and regional influences, creates a more volatile, complex, uncertain, and ambiguous security environment.

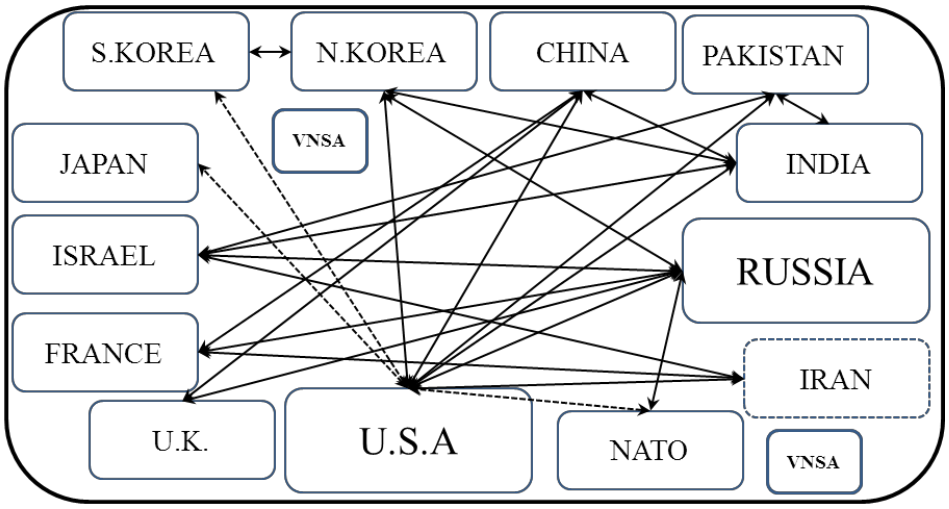

Figure 2. Graphic Representation of the International Nuclear Security Environment through 2010. Dotted Line represents extended deterrence agreements. Dashed line around Iran indicates suspected proliferation efforts. VNSA represents violent non-state actors.

The failure of deterrence to stem the increase in nuclear-armed actors since the end of the Cold War leads to a debate regarding the utility of deterrence.[7] There exists some validity to this argument. The United States, as the single greatest power, is in possession of a conventional force that clearly outmatches all other conventional forces, and the largest strategic nuclear arsenal on the planet appears limited in its ability to coerce or deter other nation-states and non-state actors. [8] Instead of questioning the utility of deterrence, perhaps new strategic thinking on the utilization or tailoring of deterrence for the new strategic environment is required. This manuscript argues the question of what is more appropriate for today's environment: a general nuclear deterrence policy or a tailored deterrence policy. Figure 2 serves as a representation to highlight the requirements of deterrence and assurance for both adversaries and allies respectively within a regional and global context, including the effects of extended deterrence commitments. The manuscript compares and contrasts general deterrence with tailored deterrence and provides recommendations for future tailored deterrence policy efforts.

What is Wrong with Tailored Deterrence?

If tailored deterrence provides the best path forward to ensure global security and stability, one may rightly question why the United States has not embraced this shift in deterrence thinking. There are three main intellectual and theoretical challenges to tailored deterrence. Classic deterrence, structural realism, and pragmatism and each present potent arguments for not embracing the concept of tailoring deterrence. A presentation of each argument ensues, with analysis of the current strategic environment depicted in Figure 2—supporting the validity of tailored deterrence.

Classic Deterrence

While there currently exists a growing body of work regarding tailored deterrence, the cornerstone of U.S. strategic planning from the Cold War to the present is focused on the theoretical work of Brodie, Schelling, Kahn, and others who followed in their footsteps. Furthermore, the theoretical frameworks established and applied to policy making seemingly work. The Cold War ended without ever turning into a nuclear war. Thomas Schelling's stable balance of terror that leaves something to chance for the rational actor served as the guiding principle for U.S. strategic policy.[9] Herman Kahn's emphasis on defensive capabilities with an asymmetric advantage in favor of the United States arguably served as the basis for the Strategic Defense Initiative and current missile defense initiatives. [10] The language and methodology used in nuclear strategic policy documents remain relatively unchanged from Cold War to the post-Cold War period. [11] The pertinent question asks whether the changing security environment, from bipolar to multipolar, diminishes the utility of classical deterrence tenets. Do the current language of deterrence and calculations of weapon requirements reflect the new environment or institutional inertia? Arguably, the assumptions of Cold War deterrence no longer apply due to changes in the strategic environment and technological developments; however, institutional inertia may serve as the driving factor for the current approach to deterrence. [12] Figure 1 provides an illustration of the Cold War strategic environment. The rationale proved largely valid, although evidence exists that the Soviet Union did not hold

the same convictions.[13] Looking at Figure 2 and taking into account the varying arsenal size of the nuclear powers, it becomes harder to argue that all nations possess a secure second-strike capability. Thus, a major tenet of classical deterrence comes into question. Further, as the number of leaders in possession of nuclear weapons increase, the odds of all leaders behaving rationally decreases. As evidence suggests, in times of crisis, individuals begin to operate less rationally and rely more on heuristics to make decisions.[14] The other complicating factor involves unintentional signaling. As seen in the case of India and Pakistan, recent dialogue with India over its nuclear weapons enterprise created negative signals in Pakistan, potentially inducing new momentum for a buildup in Pakistani weapons.[15] Operating from a one-size-fits-all approach in today's multipolar world introduces greater potential for miscalculation and inadvertent signals due to greater complexity of the international security environment. Tailoring messages and capabilities to a specific leader in a specific context provides a higher degree of probability for deterrent success and lowers the probability of miscalculation and inadvertent signaling.

Structural Realism

Structural realism, a variant of classical realism, argues that the tripartite conception of functional differentiation, ordering principles, and power distribution forces leaders to act in a specific manner regardless of their personal nature.[16] Kenneth Waltz, considered by many as the father of structural realism, presents a powerful argument that nuclear weapons increase stability in the international arena and that the weapons' magnitude of destruction affects all leaders in the same manner.[17] Regardless of the adversary, nuclear weapons serve a primary deterrence role.[18] This presents a powerful argument, and the historical record provides some validation of Waltz's premises.

The foundation of the structural realist argument involves a focus on great powers, since these states dominate the international system. According to Waltz, "A state becomes a great power not by military or economic capability alone but by combining political, social, economic, military, and geographic assets in more effective ways than other states can."[19] Using this definition, structural realists would arguably view the

Cold War world the same as Figure 1 depicts: a bipolar environment. However, disagreement may occur with Figure 2 depicting a multipolar world. Arguably, the situation – from a structural realist viewpoint – more closely resembles a unipolar world with the United States as the sole great power. For structural realists, a bipolar world such as that during the Cold War provides the best stability in the international system, followed by a unipolar world, with a multipolar world creating the most instability and greatest probability for miscalculation.[20] The fundamental argument then becomes whether the description of the international system today is unipolar or multipolar. Clearly, U.S. capabilities create a scenario where there exists no peer competitor; however, U.S. interactions with nuclear states create a perception of multipolarity. The most obvious case in favor of this perception involves the Bush administration's diplomatic actions against North Korea and conventional actions against Iraq. [21] Both countries are viewed as rogue states, with North Korea presenting a more imminent proliferation concern, and should dictate actions other than diplomacy from a realist perspective.[22] However, with China (an ally of North Korea) possessing a capable nuclear arsenal, a softer approach was necessary than with Iraq. Therefore, while relative power alone might indicate a unipolar international system, eight other nuclear weapon states arguably create a multipolar environment. Thus, tailoring American deterrence to reduce miscalculation and miscommunication could provide a better path forward.

Pragmatists

The argument against tailored deterrence from a pragmatic point of view does not necessarily encompass a single, coherent worldview regarding international relations. Realists, liberals, and constructivists may align with this simple and compelling argument: there exist nearly insurmountable obstacles to executing tailored deterrence. [23 , 24] The obstacles run the gamut from institutional bureaucracy to cognitive biases. Lt Col Sean Larkin and David Yost offer poignant and detailed challenges to tailored deterrence from U.S. and NATO perspectives, respectively.[25] While these authors posit a variety of challenges, their respective arguments overlap on one critical element of tailored deterrence: understanding the adversary. [26] The need to understand the adversary

originates from ancient times, with history illustrating this need with both successful outcomes based on understanding the adversary and unsuccessful outcomes due to ignorance. [27] Larkin emphasizes the insurmountable aspect of this challenge, pointing out the various heuristic and cognitive biases that *all* people use when making decisions.[28] Clearly, when applying this argument against Figure 2 of the international system, an already complex picture potentially increases exponentially in complexity. Should the United States then reject the concept of tailored deterrence for a general deterrence approach, since following the tailored deterrence path promises ever higher degrees of complexity and builds itself from the foundation of understanding specific adversaries? The short answer is "no." Sir Francis Bacon wrote, "*ipsa scientia potestas est*" ("knowledge is power") in 1597, and much of deterrence theory builds on this foundation. [29] Regardless of which wave of deterrence theory one supports, a requirement exists to have some level of knowledge of the adversary to generate a cost-benefit calculation. The premise of tailored deterrence attempts to increase knowledge of a specific adversary, enabling a country to choose the best option to influence an adversary's cost-benefit calculation. The complexity of the current international system reinforces the need to focus greater energy on different adversaries and how to best communicate clear deterrence messages. Will this approach guarantee desired results in all scenarios? The answer to this question remains the same for classical deterrence. How does one prove the outcome of a mental cost-benefit calculation? A commitment to tailored deterrence ensures that the United States expends effort attempting to better understand adversaries in today's environment versus relying on Cold War theories created in a vastly different security environment.

What is Tailored Deterrence?

Chronological Development

With the end of the Cold War, the role of deterrence faded from its central role in guiding U.S. national security. Multiple explanations describe this decline. Therese Delpech argues that the success of deterrence in the Cold War led to a loss of prominence.[30] Keith Payne

suggests intellectual hubris; we think that we know all that we need to know regarding deterrence.[31] Lawrence Freedman argues that changing circumstances reduced the need to rely on deterrence.[32] Regardless of which view accurately describes the reason, there exists wide agreement that intellectual thinking on deterrence theory declined precipitously after the Cold War. The degree of detriment to national security resulting from the decline in intellectual thinking on deterrence remains a topic of debate. To address this decline in thinking, Keith Payne introduced a detailed framework for the concept of tailoring deterrence to specific actors in specific situations to address the radically different international security environment.[33] Payne listed many factors for shifting from a Cold War deterrence framework to a tailored approach. One of the cornerstone issues involves intertwining the separate ideas of rational and reasonable behavior.[34] As stated earlier, the foundation of deterrence theory assumes a rational actor. Anticipation of how a potential adversary might respond to deterrent signals largely involves the process of mirror imaging and deductive logic, although the United States expended great effort and cost to understand its Soviet adversary.[35] The fundamental problem of mirror imaging and deductive logic involves the introduction of inherent miscalculation and misperception errors due to personal cultural values or filters becoming imposed on adversaries.

To avoid introducing these systematic errors and reduce the probability of miscalculation and misperception, Payne advocates a six-step information gathering and analysis framework centered on the key decision maker(s) in specific situation(s) to best guide U.S. efforts in tailoring deterrence capabilities.[36] For deterrence to work in a complex environment, policy makers need to cease expecting a rational and predictable adversary and begin gathering as much information about specific adversary characteristics, beliefs, and values as possible.[37] In Payne's words, "The primary areas of interest in this framework are characteristics of: the pertinent leaderships/countries, their motivations, goals, and determination, the nature of decision-making, the object of the friction (the 'stakes' involved), the regional political/security context, and the sources of power available to the participants."[38] The design of the framework gets inside the decision-making process, ascertains values, and identifies critical decision factors to better ensure the success of deterrence actions.[39] The framework serves as an empirical guide, not as a magic

bullet, since no parsimonious solution exists in ensuring deterrence works.[40] More importantly, embracing the concept of tailoring deterrence breaks with the intellectual hubris of assuming that the Cold War deterrence framework knows how deterrence works in all situations.[41] The first official government usage of tailored deterrence occurred in the 2006 Quadrennial Defense Review (QDR) followed by the 2006 NSS.[42] The 2006 QDR and NSS advocated tailoring deterrence and capabilities yet failed to adequately describe the actual mechanics. [43] The 2010 NSS continues advocating tailoring deterrence and capabilities in the same manner as the 2006 edition.[44] To address the actual mechanics of tailored deterrence, the DOD published the Deterrence Operations Joint Operating Concept (DO-JOC) in 2006.[45] The DO-JOC serves as the single source document outlining the whole-of-government approach toward tailored deterrence. Lt Col Larkin, in his critique of tailored deterrence, gives a thorough and penetrating review regarding the theoretical basis and mechanics of tailored deterrence contained within the DO-JOC. [46] His analysis is that the DO-JOC "… is an amalgam of second and third-wave deterrence theory, heavily influenced by effects-based operations concepts," which correctly summarizes the theoretical underpinnings of the document.[47]

M. Elaine Bunn further developed the tailored deterrence concept by emphasizing the three key facets of tailoring involving actors, capabilities, and communication. [48] In tailoring to specific actors, she identifies the types of information the United States needs to gather, with the understanding that some information may be difficult to discern.[49] Regarding capabilities, Bunn points out the confusion regarding how to program and project capabilities needed for scenarios both in peacetime and crisis situations. [50] The final point highlights the need to tailor messages, both verbal and non-verbal, and avoid the sending of conflicting messages.[51] Bunn effectively highlights that everything that the United States says, does, and possesses sends verbal and non-verbal messages towards potential adversaries. [52] The deeper meaning implied is that peacetime actions may have more impact on adversaries' perceptions than messages sent during a crisis.[53] A thorough understanding of this point would improve intentional messaging of American policy makers.

In 2007, Dr. Jasen Castillo outlined the categories of adversary characteristics that influence tailored deterrence capability, credibility, and

communication.[54] He highlighted potential differences, motivations, and dangers for near-peer competitors, rogue states, and non-state actors that motivate their use of unrestricted warfare and how these differences affect the implementation of tailored deterrence options.[55]

In 2009, Jeffrey Lantis examined the relationship between strategic culture and tailored deterrence. He explored links between culture and deterrence, identifying scope conditions that increase the utility of models for military-security policy.[56] These scope conditions included states with dominant cultural narratives, determined leadership, and prominent military organizations and identified potential areas where cultural knowledge helps explain patterns of non-state actors.[57]

Also in 2009, Dr. Kevin Murphy undertook the task of defining and developing an analytical framework that "helps identify, from the perspectives of the social and behavioral sciences, which questions analysts should consider asking of this research community in developing and evaluating tailored deterrence strategies."[58] The paper also considers the challenges in synthesizing the information for decision makers when considering the relevance, comprehensiveness, and reliability of sources.[59]

As the chronological development shows, the area of tailored deterrence represents a relatively recent approach towards the larger concept and more well-developed concept of deterrence. While the chronological development does not represent an exhaustive list of all writings, it highlights the evolution of thinking regarding tailored deterrence and demonstrates the systematic development of the field.

What Tailored Deterrence Gets Right

The factors and framework advocated by Payne and Bunn build from general deterrence theory by narrowing the scope for specific actors and situations and gaining as much insight as possible regarding adversary thought processes, behaviors, and values. The concept abandons the one-size-fits-all approach based primarily on the nuclear deterrent, opting for a whole-of-government approach utilizing all the instruments of power as deemed applicable based on the information and analysis available. While detractors argue against the merits of tailored deterrence and proponents acknowledge the difficulties required in following this approach, tailored deterrence does get many things correct. Three factors that tend to get lost

in the debate over tailored deterrence deserve highlighting. They include the focus on a specific adversary, rational does not equal reasonable, and the twenty-first century complex environment as a game changer.

Focus on the Specific Adversary

General deterrence theory acknowledges that, in order to deter an adversary, the adversary's perception of the deterrence threat must be credible and force a cost-benefit calculation; the theory then created the rational and predictable actor to develop a workable model. Adversary actions now become a mirror imaging exercise, with possible courses of action tainted by Western cultural values. In contrast, tailored deterrence focuses on the specific adversary in their environment and analyzes the adversary's statements and actions to gain insight into the thought processes and decision-making calculus. Instead of mirror imaging behavior, tailored deterrence seeks to truly understand an adversary's behavior and perceptions. Tailoring seeks to get into the mind of the adversary to the greatest extent possible. [60] As Marine General James Mattis clearly stated, "… the enemy gets a vote;" tailored deterrence seeks to predict the enemy vote in the most realistic manner.[61]

Returning to Figure 2 as a depiction of today's complex strategic environment, the task tailored deterrence sets for itself is daunting. Multiple and varied actors exist in different regional contexts, with varying interests and associations. With certainty, a temptation exists to simplify the complexity by assuming rational behavior and developing general policy options to deter or dissuade adversaries; however, the wide spectrum of cultural values, relationships, and American commitments, compounded by non-state actors and globalized communications, practically ensures that actions in one region affect other regions, and multiple interpretations and perceptions result. Without devoting the effort to understanding each adversary, a blanket approach logically leads to counterproductive and potentially detrimental follow-on effects. Attempting to understand a specific enemy's regional context, values, and beliefs logically leads to a better probability of successful dissuasion or deterrence with less probability of detrimental follow-on effects. Again, without complete knowledge, no theory of deterrence can guarantee success in every situation; however, departing from an assumption of

rationality, as defined in Western thought, provides a better foundation from which to navigate today's complex environment.

Rational versus Reasonable

The second area that tailored deterrence gets right concerns the separation between the meanings of "rational" and "reasonable." While "rational" and "reasonable" are nearly synonymous in definition, their usage possesses differences that can lead to erroneous results. "Rational" implies cold logic in decision making, while "reasonable" incorporates norms and behavior, as understood by the recipient. A rational individual can make demands that appear unreasonable. Tailored deterrence acknowledges that all individuals possess filters that modify rational and, more importantly, reasonable thinking. According to Payne, Cold War deterrence thinking ignores the opponent's filter and predicts opponent behavior using one's own filter.[62] The tailored deterrence framework seeks to understand the adversary's filter by examining the psychological and cultural anthropological factors that create the filter. Understanding the filter of an adversary better equips policy makers and analysts in predicting the interpretations and perceptions of U.S. actions. As Bunn writes, "The message intended by our actions and statements is less important than the message received." [63] A poignant example of this statement occurred in the Truman administration when the Secretary of State's comments were interpreted as excluding South Korea from a statement of U.S. interests, thus potentially opening the way for a North Korean invasion.[64] With certainty, the United States did not intend to send such a signal, but failure to understand how North Korea and the Soviet Union would perceive the statement arguably opened the way.

Again, viewing today's complex environment, the same temptation to simplify applies with the same logical conclusions. Reasonable from a U.S. point of view does not equal reasonable in every other region. The different psychological and cultural anthropological factors clearly lead to different interpretations of rational and reasonable thinking and actions. A blanket approach establishes the conditions for miscalculation and misperception. Making the attempt to understand the filters allows the United States to tailor capabilities and messages that produce a better probability of success in assurance of allies and deterrence of adversaries.

The increase in complexity and risk in the current security environment with multiple nuclear armed actors practically demands that the United States seek to understand these adversary filters to avoid misperception and miscalculation.

The Game Has Changed

The risks and potential catastrophic consequences of failed nuclear deterrence require serious thought and deliberation. The utilization of a game analogy in the following argument is meant only as an analogy for illustrative purposes. Arguably, the fundamental question in applying nuclear deterrence concerns the determination of quantitative requirements for ensuring assurance and deterrence. In the modern lexicon, how much is enough? Payne makes the compelling argument that Schelling's stable balance of terror took prominence, since it allowed for an empirical calculation of warheads to targets.[65] Post-Cold War thinking on the arsenal reflects a continuation of the calculation process.[66] The problem with this approach in today's complex environment is that a stable balance of terror paradigm ceases to exist. No longer does the United States play a chess match against a singular, evenly-matched opponent. Nine asymmetrical players now sit at the proverbial poker table with others attempting to join. Furthermore, the stakes and rules in the game are different for each player. The shift towards tailored deterrence acknowledges the changing game and attempts to understand the internal dynamics of the game. A general blanket-approach inherently assumes the other players abide by a set of understood rules with no intent of breaking them. The inherent risks with this approach, given the consequences of failure, are too high to utilize a one-size-fits-all mentality. A better approach seeks understanding the personalities, idiosyncrasies, and risk tolerances of each player. This allows for a better prediction of which "cards" to play and in what order to best influence the desired outcome.

Recommendations

As the 2006 and 2010 NSS demonstrate, the United States intends to embrace a path of tailored, whole-of-government approach towards assurance and deterrence. The framework and guidelines established to

date serve as a good foundation; however, the requirement exists for more intellectual thinking and honest debate on the topic. In the abundance of literature regarding deterrence in the twenty-first century, two areas stand out as potential areas needing further commitment and examination: revitalization of nuclear weapons and exploration of behavioral economics as an explanatory variable.

Revitalizing Nuclear Weapons

According to Dr. Stephen Younger, nuclear weapons differ in design based upon the intended mission and technological capabilities present at the time of construction.[67] The current U.S. arsenal, designed and built during the Cold War against a specific adversary, the Soviet Union, held specific target sets at risk. With the changes in the post-Cold War strategic environment, the U.S. thinking on deterrence shows change and adaptation to this new environment; however, the weapons and infrastructure, while smaller, remain relatively unchanged. With the monumental advances in technology, our current arsenal truly remains a technological relic of the Cold War. Tailoring capabilities to specific adversaries requires capabilities adaptable to the spectrum of targets. While U.S. conventional capabilities display exceptional adaptability and continual modernization, the nuclear arsenal needs modernization, to include new weapons that will hold the entire spectrum of targets at risk.

Another argument in favor of revitalization involves U.S. credibility. Actions speak louder than words. While U.S. rhetoric appears credible, the decaying infrastructure sends a signal to adversaries that the United States considers nuclear weapons relics of the Cold War and, arguably, has little will to actually use a nuclear weapon again. Revitalization sends a clear, credible signal that the United States remains committed. As credibility provides the foundation for all deterrence efforts, modernization needs to occur.

Behavioral Economics Theory

In 1979, Amos Tversky and Daniel Kahneman developed a behavioral economics model called Prospect Theory that resulted in the 2002 Nobel Prize in Economics. [68] Prospect Theory and the modified version of cumulative prospect theory look at decision-making involving

risk and uncertainty incorporating cognitive biases and heuristics.[69] While the third wave of deterrence theory involves cognitive biases, no clear connection of applying Prospect Theory to deterrence currently exists.[70] Currently, Prospect Theory suggests more decision phenomena than established decision-making theories can explain. As a simplified example, Adam Lowther makes the argument that possessing nuclear weapons serves as a stabilizing influence.[71] This argument fits with the prediction of Prospect Theory that as individuals gain value (weapons), their reference point shifts, and their view of gains and losses can lead to risk-averse behavior.[72] The preceding example is meant only to show the potential correlation between observed state behavior and Prospect Theory predictions and does not imply a de facto correlation. Much more rigorous analysis would be needed to determine if a true correlation exists. However, given the seminal work between game theory and deterrence, a clear opportunity exists.

Conclusion

With the end of the Cold War, the intellectual thinking on deterrence diminished, and the resulting international security environment grew in complexity, with multiple nuclear-armed adversaries and violent non-state actors. In response to changes in the environment, the United States altered its approach regarding deterrence, shifting from a one-size-fits-all mentality to tailoring deterrence messages and capabilities for specific actors in specific situations. The shift resulted in varied degrees of acceptance and criticism. The new framework seeks to understand the norms, values, culture, and decision-making processes of adversaries within their regional contexts to better predict adversary behavior and to avoid misperception and miscalculation that undermine deterrence efforts. Tailored deterrence shifts from the Cold War deterrence framework that utilized mirror imaging and deductive logic and seeks to clearly understand how adversaries filter and process incoming information while making decisions. Additionally, tailored deterrence views the world as it exists today, with multiple nuclear-armed states and stakes in the game that clearly change the playing field.

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CHAPTER 8

The Case for a New Nuclear Weapons Arsenal

Eric Y. Moore

The U.S. nuclear arsenal was created during a time when the United States had a singular adversary in the Soviet Union and relied upon the concept of Mutually Assured Destruction (MAD) to protect the United States and its allies. This concept relied upon a massive arsenal of nuclear weapons to ensure that Soviet targets could be credibly destroyed in a second strike if a nuclear war were to break out. At the height of the Cold War, the United States maintained over 20,000 nuclear warheads. Today, Russia, China, and other countries still maintain large and ever-expanding arsenals that present an existential threat to the United States. The very existence of their nuclear stockpiles make America's nuclear triad – bombers, ICBMs, and SLBMs – relevant in order to provide continued deterrence. The fall of the Soviet Union not only eliminated the greatest singular threat to the United States, it also created conditions for previously-controlled rogue regimes and terrorist organizations to flourish. In a significant change from the days of the Cold War, the United States must now be concerned with the emergence of a nuclear-capable rogue state such as North Korea, the nuclear aspirations of Iran and Syria, along with the potential of violent non-state actors (VNSAs) to acquire and use nuclear weapons. The United States is not only experiencing a shift in the security environment, but also a shift in domestic support for its nuclear arsenal. Today, it is popular, even chic, to demand the elimination of all nuclear weapons.

Nuclear abolitionists suggest the United States no longer has the will to use nuclear weapons in any case except in response to a large-scale nuclear attack. They also believe that even if the United States were attacked with a nuclear weapon, the United States would likely respond with conventional force. There are two reasons for this belief. First is the

ability of the defense industry to produce technologically advanced weaponry. This reliance on conventional military might is understandable. Second, abolitionists believe Americans would avoid retaliating with nuclear weapons because of the devastating power. The yields of most warheads are so great that they generate unintentional collateral damage and radioactive fallout. These effects make the current nuclear arsenal "unusable" and ensure "self-deterrence." Arsenal detractors also point to the President's April 2009 speech in Prague, Czech Republic, where he said, "The United States will take concrete steps towards a world without nuclear weapons."[1] They also point to the 2010 NPR as evidence that the nuclear arsenal is irrelevant in today's security environment. According to the NPR Report, "The massive nuclear arsenal we inherited from the Cold War era of bipolar military confrontation is poorly suited to address the challenges posed by suicidal terrorists and unfriendly regimes seeking nuclear weapons." [2] Stephen Younger, former director of the Defense Threat Reduction Agency, states, "Out of concern that any changes in the weapons in our nuclear arsenal would result in a new arms race, the United States continues to maintain an arsenal vastly more powerful than we need."[3]

Ironically, the NPR's challenge to the relevance of the nuclear arsenal also suggests a way ahead. In order to improve the nuclear arsenal's ability to deter and counter current and future security threats, as well as provide an effective extended deterrent, the United States should develop new nuclear warheads (of variable yields) that augment the current high-yield strategic nuclear inventory. The United States needs to develop and field warheads for ICBMs, SLBMs, and bombers that are maneuverable and low-yield, as well as resume research and development of nuclear munitions that are capable of deep earth penetration. Stephen Younger supports this argument: "A stockpile in which 90 percent of the weapons had ten kilotons of yield and the remaining 10 percent had five hundred kilotons is compatible with most future targeting requirements."[4]

The development of new nuclear warheads will require American decision makers to abandon their support for "global zero" and overturn the current policy of "no new nuclear weapons." This is necessary to better deter and defeat threats below the existential level and improve the deterrence value of the nation's nuclear arsenal.

Threats

Scott Sagan, a respected scholar, writes, "States exist in an anarchical international system and must therefore rely on self-help to protect their sovereignty and national security."[5] This statement provides some insight into the most significant reason states seek to develop or acquire nuclear weapons—national security. For some autocratic regimes, the liberal values of the United States are a significant threat to national security. An American penchant for regime change can be described as a two-edged sword. On one edge, the United States installs a new regime that is sympathetic to American interests. On the other edge, regime change can lead "rogue" regimes to seek to balance against the overwhelming superiority of the U.S. military. These regimes view nuclear weapons differently than the United States. Rogue regimes view nuclear weapons as an asymmetric counter to U.S. conventional military capabilities.[6] There are three regimes that concern the United States the most: North Korea, Iran, and Syria. Recent diplomatic developments with Iran as well as small improvements in Syria's ongoing civil war have reduced, but not eliminated, tensions over their nuclear weapons programs. This leaves North Korea as the regime of greatest risk at the present.

North Korea's nuclear weapons program has been a significant worldwide security issue for over two decades. As early as 1992, the United States worked to issue nuclear security guarantees to North Korea in exchange for its compliance with International Atomic Energy Agency (IAEA) safeguards. In 1994, a framework was laid out to provide 500,000 tons of heavy oil and light-water reactors in exchange for North Korea closing its nuclear facilities.[7] This agreement was short-lived. In January 2003, just prior to the U.S. invasion of Iraq, North Korea withdrew from the NPT, reopened its nuclear facilities, and reenergized its nuclear weapons program. According to intelligence officials, North Korea detonated its first nuclear weapon in 2006. The detonation produced a low yield and was believed to be a partial failure. However, North Korea has conducted two more tests. After conducting their latest test in February 2013, North Korean officials stated that the device was a miniaturized weapon design. [8] This new design would indicate a significant and unforeseen advancement in North Korea's design capabilities and would

highlight intelligence shortcomings concerning North Korea's nuclear program. The ability to gather intelligence within a closed and ethnically homogenous society, such as North Korea, is extremely difficult and heightens the security concern that the North Korean nuclear weapons program poses for the United States.[9]

Along with its nuclear warheads, North Korea has worked tirelessly to develop the Nodong missile. This IRBM has a range of 900 miles and is capable of reaching targets in South Korea and Japan, thereby creating an increased security concern for two of the United States' closest allies.[10] North Korea also developed the longer-range, three-stage Taepo Dong ballistic missile, which can reach Alaska and Guam, and an even longer-range Taepo Dong-2 variant is under development.[11] This missile would be North Korea's first ICBM and would be capable of targeting the continental United States. [12] The intelligence community assesses that North Korea possesses approximately ten nuclear weapons but no operational ICBMs at this time.[13]

The North Korean government has three purposes for its nuclear weapons arsenal. First, the regime seeks to bolster its prestige. Second, North Korea's nuclear weapons allow the regime to engage in coercive diplomacy with more powerful states such as the United States, South Korea, and Japan. Third, North Korea sees its nuclear weapons as an asymmetric counter to the superior conventional military power of the United States—effectively deterring an American attack or invasion.[14]

Although rogue regimes are a threat, intelligence officials suggest that the greatest threat to the United States and its allies is nuclear terrorism.[15] In 2006, "Russian Federation President Vladimir Putin and United States President George W. Bush jointly announced the creation of the Global Initiative to Combat Nuclear Terrorism (GICNT) during the G8 summit in St. Petersburg, Russia." [16] The GICNT has 85 participant countries committed to securing nuclear weapon materiel and to "strengthen global capacity to prevent, detect, and respond to nuclear terrorism through multilateral activities that strengthen the plans, policies, procedures, and interoperability of partner nations."[17]

Terrorist organizations that seek nuclear weapons are unlikely to undertake large-scale nuclear weapons development programs. According to Joan Rohlfing of the Nuclear Threat Initiative, "The shortest path to a terrorist bomb would be for a terrorist organization to steal what it needs

to make a nuclear weapon—only a soda can's amount of plutonium or highly enriched uranium (HEU) equivalent to a five-pound bag of sugar." [18] In 1966, three postdoctoral students at Lawrence Livermore National Laboratory (LLNL) participated in an experiment called the Nth Country Experiment. Their task was to design a functioning nuclear weapon without access to any classified information.[19] LLNL physicists determined that, "These three physicists, using access to only open source information, were able to design a workable implosion-type weapon in less than three years."[20] They were only missing the necessary nuclear material.

The question remains, where would terrorists get this nuclear material? Rachel Oswald, of the Nuclear Threat Initiative, reports that hundreds of nuclear tests were conducted at Semipalatinsk, a former Soviet nuclear test site in Kazakhstan.[21] According to the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), 456 atomic and thermonuclear tests were conducted at this site.[22] These tests left behind considerable fissile material. According to Sergey Lukashenko, director of the Institute of Radiation Safety and Ecology at Kazakhstan's National Nuclear Center, despite efforts to clean and secure the site, "A real likelihood exists that more nuclear material remains out there, buried beneath the soil of the Semipalatinsk steppe, unsecured and potentially vulnerable to theft."[23]

The theft of nuclear weapon material from test sites is only part of the concern. Terrorists can steal weapon-grade material from current nuclear powers by overwhelming security measures. In 2013, United States Department of Energy personnel, playing the role of terrorists during a security exercise, successfully stole a substance representing nuclear weapon material.[24] Pakistan, with its proximity to Afghanistan and terrorist activity, is especially vulnerable to similar attacks on its nuclear stockpile.[25] There are two especially troubling possibilities in Pakistan. First, the possibility exists that nuclear sites would be attacked by local extremist groups. Second is the possibility that "radical militants would be able to infiltrate the military or intelligence agencies, giving them a better position to gain access to nuclear materials."[26] Even though Pakistan has taken considerable measures to ensure the security of its nuclear stockpile, threats from terrorists and the consequences of a terrorist with a captured nuclear weapon remain.[27]

Arguments against a Revised Nuclear Weapons Arsenal

Despite the consequences that nuclear-armed rogue regimes and terrorists pose to national security, there remain a great number of people opposed to the United States' responsible stewardship and potential employment of nuclear weapons. For abolitionists, even the discussion of nuclear weapon benefits, much less discussion of creating new nuclear weapons and capabilities, is seen as threatening. Detractors offer three primary arguments.

First, the development of a new nuclear warhead will be a departure from President Obama's Prague speech, in which he declared a commitment to a world without nuclear weapons, as well as the 2010 NSS which states, "We are reducing our nuclear arsenal and reliance on nuclear weapons." [28] A new nuclear weapon may also require testing. Nuclear abolitionists highlight the fact that the United States is a signatory to the CTBT, although the Senate has not ratified the treaty. Resumption of nuclear testing would constitute a breach of the treaty and potentially invite other signatories to test nuclear weapons.[29] The United States, the Soviet Union, China, France, the United Kingdom, India, Pakistan, and North Korea have conducted over 2,000 nuclear tests since 1945, but fewer than two dozen since 1992—all by India, Pakistan, and North Korea (see Figure 1).[30]

The effects of nuclear testing can be unsettling. Nuclear abolitionists point to a study in *American Scientist* that indicates that samples of bone, gland, and other tissue show that specific radionuclides in fallout material create fallout-related cancers.[31]

The second argument offered by abolitionists suggests that a new low-yield nuclear weapon is inherently destabilizing. While a lower-yield nuclear weapon would reduce battle damage, fallout, and collateral damage, these very characteristics would make it more useable and therefore destabilizing. This situation would make it difficult to control wartime escalation and could increase the potential for an adversary to preemptively strike the United States.[32] Abolitionists cite the removal of U.S. battlefield nuclear weapons from Europe as evidence of the inherent destabilizing nature of any weapon with a low yield. Tactical nuclear weapons were designed to be employed by American forces to deter "a

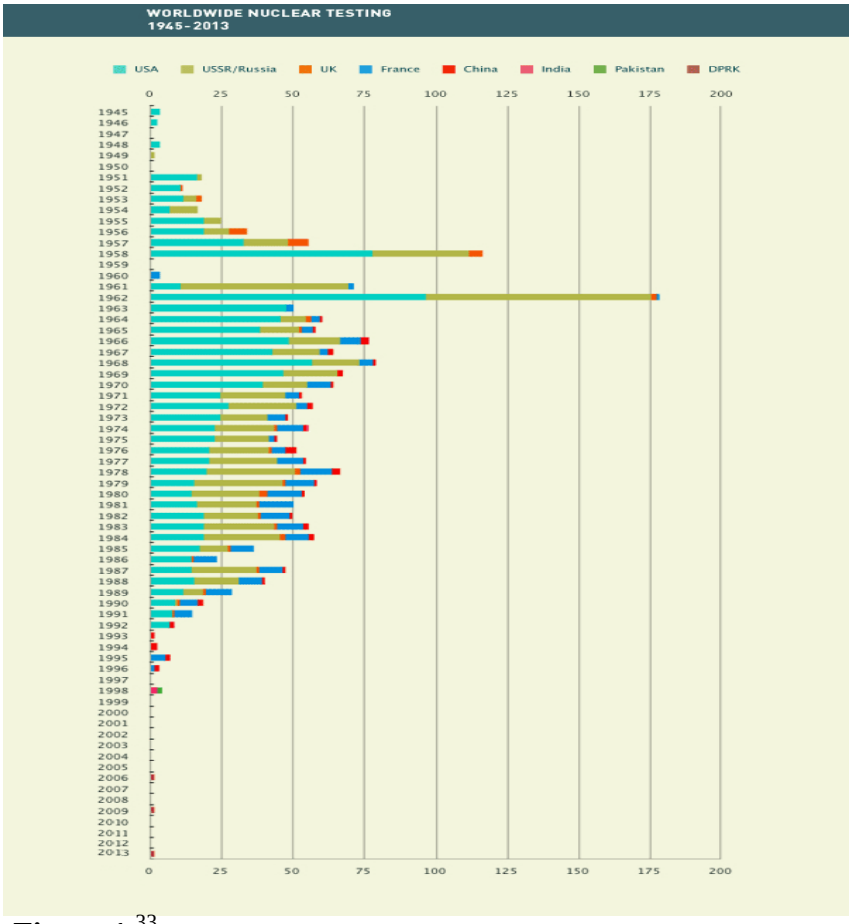

Figure 1.[33]

Soviet conventional attack on Western Europe."[34] U.S. tactical nuclear weapons were removed for several reasons. Because of the weapons' small size, tactical nuclear weapons were susceptible to theft and employment by terrorist organizations. The collapse of the Soviet Union also reduced the need for tactical nuclear weapons in Europe. Russia also used the presence of tactical nuclear weapons as an excuse to avoid further talks on the reduction of its own tactical weapons arsenal. Lastly, the United States and Europe experienced a growing anti-nuclear movement that argued that the United States could maintain its extended deterrence with conventional forces and strategic nuclear weapons. Simultaneously,

several NATO members withdrew their support for tactical nuclear weapons due to changes in their domestic politics.[35]

Finally, nuclear abolitionists argue that the President would never use a nuclear weapon, except in a large-scale attack, making the development of new nuclear weapons and capabilities a waste of resources.[36] This argument suggests that although the United States has significant nuclear capabilities, it lacks the will to use them. In order for the United States to maintain a credible nuclear deterrent, it must maintain both the capability to inflict destruction upon the adversary and the will to use that capability. In short, capability plus will equals credibility. One aspect of deterrence without the other neutralizes the nuclear arsenal's deterrence value. For example, suppose North Korea launched an unexpected nuclear attack on the United States. Although the United States has the nuclear capability, would the President have the will to drop a third nuclear weapon on an Asian population, or would a conventional option be more palatable?

The abolitionists' argument suggests that if the United States were to be struck by a single nuclear weapon that did not threaten national sovereignty, the President would not retaliate with nuclear weapons. The fear of escalating the conflict to a larger nuclear conflict is one possible reason why a nuclear response would not come. A second reason is based on a scenario where the attack is not delivered by a ballistic missile. Here, attributing the attack with 100% accuracy would be time-consuming. The time it would take to achieve attribution would give political leaders the necessary time to contemplate the consequences of a nuclear response and be dissuaded from such action. Lastly, according to a senior DOD official, there is a belief that Americans are unwilling to trade New York or Los Angeles for Tokyo or Paris, should the attack be against an ally.[37] It is believed that a nuclear response to a nuclear attack upon an ally would invite a subsequent attack upon the United States and is entirely unacceptable to Americans.

Counter Argument

The world has enjoyed relative peace since the development and use of the first atomic weapon. According to Kenneth Waltz, over 60 years without great-power war have elapsed since the end of World War II,

because nuclear weapons elevate the potential costs of great-power conflict too high. [38] Even more telling, the total number of casualties (civilian and military) during World War I and II was 96 million people. However, the number of global conflict-related casualties since then are down a staggering 89%.[39] When one examines the evidence, it is clear that nuclear weapons greatly improve the prospects for great-power peace.

Since states seek to maximize their own security, the acquisition of nuclear weapons is an inherently defensive act of "self-help."[40] To ensure that nuclear weapons remain a defensive weapon of "sovereignty insurance," the United States must maintain a capable and credible nuclear arsenal. Nuclear abolitionists have conveniently failed to point out that President Obama acknowledged this reality in his Prague speech when he said, "Make no mistake: As long as these weapons exist, the United States will maintain a safe, secure and effective arsenal to deter any adversary, and guarantee that defense to our allies."[41]

Detractors have also overstated the destabilizing aspects of testing a new nuclear weapon. Not only are advocates of CTBT ratification incorrect in suggesting that below-ground tests are destabilizing, but they also seem to forget that India, Pakistan, North Korea, and potentially Iran all became nuclear powers at a time when the established nuclear powers had ceased testing and did not resume testing in response. This calls into question the suggestion that nuclear testing can lead to further proliferation, as there has not been an all-out effort for every state to acquire a nuclear weapon.

For the United States, the costs and benefits of testing present a complex issue. In an off-the-record discussion, a senior NNSA official stated, "It is possible to use existing designs and detonate only the primary part of the physics package and produce a substantially lower yield while remaining within the guidelines of current designs."[42] Additionally, a new warhead developed using a "gun-type" system similar to that used on the first atomic weapon would not require testing. In fact, designers were so certain of the reliability of such a design that it was never tested prior to use against Japan.[43] The Nth Country Experiment discussed above helps to illustrate two points. First, the physics of developing a nuclear weapon have been demystified. The postdoctoral students used open-source material to develop a nuclear weapon. Second, a working nuclear weapon can be developed without testing—although testing is useful. In fact, the

Israeli government developed a nuclear arsenal without ever testing its weapons.

However, the United States may not be able to avoid the eventual need to design, develop, and test nuclear warheads in order to maintain a credible deterrent. It is important to remember that the data currently used in advanced computer modeling is between twenty-five and fifty years old and was gained at a time when sensors were far inferior to those of today. If the need to test during weapon development is discovered, the United States should test without delay.[44]

Despite the nuclear laboratories' reliance on the science-based Stockpile Stewardship Program (SSP) to ensure weapon safety and reliability without testing, warhead components are deteriorating with no available substitutes and no data from which accurate models of deterioration can be developed. Nuclear weapon components such as beryllium are now subject to intense environmental and health standards and thus rarely produced. In 2005, the Secretary of Energy's Advisory Board argued, "… dependence on some of these older technologies is starting to burden the Life Extension Program(s) [of current U.S. nuclear weapons], for example, weapons parts that are not acceptable for factory production under modern industrial safety and health regulations or the manufacturers have stopped making their particular product or have gone out of business."[45] According to a senior Air Force nuclear officer, the United States has taken a 30-year procurement holiday in regards to its nuclear inventory.[46] This "holiday" has resulted in a shortage of critical components and those with the knowledge to design and develop them. If the United States does not recapitalize its nuclear infrastructure soon, these declining resources will be irretrievable.[47] Designing a new weapon solves many of these issues, because it is resourced and built from current materials and energizes both aging and new designers.

Contrary to the concerns of detractors, new nuclear warheads may prevent nuclear proliferation as well as improve stability. A modernized nuclear arsenal enhances extended deterrence by enabling the United States to credibly hold a wide range of targets at risk. By bolstering the capability component of the deterrence equation (credibility = capability + will), allies under the nuclear umbrella have less incentive to develop their own nuclear arsenal.[48] Modernizing the American arsenal with a range of

new warheads assures allies of the United States' commitment to extended deterrence.

Low-yield nuclear warheads deployed on ballistic missiles can also increase stability. Russia and the United States continue to maintain significant numbers of low-yield or tactical nuclear weapons in their inventories. The Center for Arms Control and Proliferation reports that the United States has approximately 500 tactical nuclear weapons deployed, to include 200 or more B-61 bombs within NATO countries.[49] Russia has nearly 2,000 tactical nuclear warheads deployed along the European border. [50] A new low-yield nuclear weapon would simply be seen as another warhead, not dissimilar from the ones currently deployed, but would have one fundamental difference. It would be less threatening than current forward-deployed weapons, because it would be deployed only on continental United States-based ICBMs and SLBMs instead of continental Europe.

Whether high- or low-yield, nuclear weapons are in an entirely different category than conventional arms. Leaders of nuclear powers tend to hold nuclear weapons in reserve as weapons of last resort. This explains the absence of a wartime nuclear detonation since 1945, even though there have been several proxy wars and times of elevated tensions, such as the Cuban Missile Crisis. Thus, detractors who suggest that low-yield warheads will become regularized battlefield weapons have failed to learn the lessons of Cold War Europe.

Nuclear abolitionists and minimalists are correct in arguing that there is a lack of political will to use nuclear weapons for any but the most extreme circumstances. President Obama's commitment to a world without nuclear weapons and the National Security Strategy's statement that the United States will rely less upon nuclear weapons are not encouraging for countries which the United States provides extended deterrence. The development of a new low-yield nuclear warhead inventory may alleviate some political concerns by demonstrating a commitment to nuclear deterrence and providing the President more palatable options in a crisis. Today, the President has few options concerning nuclear weapons. He can use the lowest-yield option on the B-61, or he can employ high-yield nuclear weapons and accept any collateral damage and radioactive debris that may result—bringing with it significant political ramifications.

A low-yield *maneuverable* weapon could also reduce the problem of overflight. Current nuclear weapons deployed upon ICBMs are likely to overfly Russia in order to reach a target not in Russia. Overflight increases the risk that Russian leadership will misinterpret a launch as targeted at Russia and possibly result in a Russian nuclear response. However, a weapon that can be launched into a high altitude then maneuver to its target without overflying Russia or other adversarial nuclear-armed countries provides the President with yet another set of viable options.

Recommendations

To achieve a more stable and secure future, American policymakers should abandon their fascination with Global Zero, revive a decaying warhead design program, and commit to the development of new nuclear weapon capabilities. The United States and its allies face new threats from state and non-state actors that present significant challenges for the current nuclear weapons inventory and its ability to achieve effective deterrence. These new challenges can be targeted and frequently deterred with a nuclear arsenal comprised of low-yield maneuverable weapons deployed on ICBMs and SLBMs as well as a low-yield deep earth penetrator.

A modernized nuclear arsenal would be invaluable in deterring offensive action from a rogue state, such as North Korea. If, for example, North Korea gave little warning that it intended to launch a ballistic missile against the United States or an ally, a low-yield maneuverable warhead mated to an ICBM or SLBM would provide the United States with the ability to rapidly reach the target and ensure its destruction without overflying Russia. North Korea also maintains one of the world's most extensive networks of hardened structures and deeply buried facilities.[51] Hardened and deeply buried targets (HDBTs) are extremely difficult to destroy. U.S. forces must have thorough intelligence on the location of HDBTs. Once these facilities are located, aircraft must penetrate hostile and potentially heavily-defended airspace to drop guided munitions on the facility. Often, facilities are so deeply buried and hardened that it takes repeated sorties to destroy the facility. When facilities cannot be accurately located and destroyed, U.S. forces attempt to seal off the facility. A low-yield deep earth penetrator, due to its greater

blast energy and thermal effects, would be capable of destroying the facility in one sortie and alleviate the requirement for multiple sorties and extremely precise (potentially unattainable) intelligence.

The threat of nuclear terrorism is another difficult challenge for the current arsenal. Terrorists often live among civilian populations. Their proximity to civilians presents a targeting challenge for conventional forces, let alone nuclear forces. However, if terrorists were to acquire a nuclear device or the material to develop a nuclear weapon, they are more likely to be deterred from using a device if the United States were perceived to be more likely to use low-yield warheads.[52]

The addition of a new low-yield nuclear warhead will improve strategic stability, because it enables the United States to better hold at risk non-traditional nuclear targets, while also demonstrating commitment to advanced nuclear capabilities—increasing general credibility. While critics may argue that a low-yield option makes nuclear war more likely, deterrence only works if an adversary believes you have the will to use your arsenal. A new low-yield option will send a clear signal to the nation's adversaries. Scott Sagan writes, "… deterrence balances are inherently stable." [53] This philosophy explains the nuclear arms race between the former Soviet Union and the United States in which each superpower sought to balance against the existential threat of the adversary's nuclear arsenal. Low-yield nuclear weapons will not invite an arms race, because the weapons are incapable of destroying an adversarial state. The most likely outcome is that the adversary will seek ways to mitigate the effectiveness of this new weapon, as all adversaries have done throughout history.

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CHAPTER 9

Should the United States Ratify the Comprehensive Nuclear-Test-Ban Treaty, or is Nuclear Weapons Testing Still Necessary?

Karyn E. McKinney

The Spanish conquistadors named a sixty-mile stretch of desert in New Mexico the Jornado del Muerto Valley, or "route of the dead man."[1] This portion of the desert had once been the deadliest and toughest part of the Camino Real, the highway that connected old Mexico to Santa Fe. Despite the lack of water, harsh temperatures, and the presence of hostile Indians, the valley was the preferred route, because it was wide enough for supply wagons to traverse. However, on July 16, 1945, its remote location and arid climate made it the perfect location for the United States to conduct the first nuclear weapon test.[2]

Since that time, over 2,000 nuclear tests have been conducted all over the world. Concerns over the effects of radiation have set many against the use of nuclear weapons for any purpose, to include testing. In response to the increased concern over the environmental effects of radiation, a partial ban on nuclear testing was established in 1963, the Limited Test Ban Treaty (LTBT). It prohibits all nuclear weapons tests or any other nuclear explosion in the atmosphere, in outer space, and under water.[3] The treaty does not ban underground testing so long as the test takes place within the territorial limits of the state conducting the explosion. Among the 126 states that have ratified the treaty are Russia, the United States, and the United Kingdom.

Even with the LTBT in effect, nuclear-armed countries continued to conduct nuclear testing underground. Nonetheless, environmental concerns continued to plague the nuclear programs. Thus, in 1996, the CTBT became the focus of nuclear abolitionists when it was adopted by

the UN General Assembly. [4] The CTBT prohibits all nuclear weapons testing, including underground testing. [5] Although the treaty has been signed by 183 states and ratified by 159, it has not been put into force.[6] Annex 2 of the treaty contains a list of 44 states which must ratify the treaty before it can be entered into force (see Appendix A). The list was developed from an April 1996 edition of the IAEA's "Nuclear Power Reactors in the World," which identified those nations conducting nuclear research, possessing nuclear reactors, or both.[7] As of June 2013, 41 of those states had signed the treaty, but only 36 had ratified it.[8] President Clinton was the first to sign the treaty, but Senate deliberations in 1999 failed to bring about the treaty's ratification. Although the United States has not ratified the treaty, it has not conducted any nuclear weapons tests since 1992.[9]

The debate over whether or not the treaty should be ratified continues. Supporters for ratification argue that the existing U.S. weapons stockpile has been tested and can be maintained under the SSP, the treaty is verifiable through the International Monitoring System (IMS), and ratification proves the United States is sincere about deemphasizing nuclear weapons.[10] Opponents of the treaty note that the current nuclear weapons arsenal continues to age and deteriorate despite the best efforts of nuclear scientists. Furthermore, the IMS will not keep states honest, as there are ways to evade detection. Finally, the resumption of nuclear weapons testing would reinforce the credibility of the United States' nuclear deterrent.[11]

The national security of the United States hinges on its ability to maintain a credible nuclear deterrent. The aging nuclear arsenal will not guarantee either a credible deterrent or national security. Ratification of the CTBT would only serve to further degrade confidence in the nuclear enterprise of the United States.

The CTBT: Rationale for Ratification by the United States

The Stockpile Stewardship Program and the Life Extension Program

The primary mission of the nuclear arsenal is to assure, dissuade, and deter.[12] In 1991, when President George H.W. Bush terminated all nuclear weapons production, it became imperative to find ways to

maintain and verify the capabilities of the stockpile. The subsequent moratorium on nuclear weapons testing in 1992 created a swift change from nuclear weapons modernization programs to indefinite retention programs.[13] The SSP and the LEP were established for the purpose of maintaining a safe and reliable arsenal.

The SSP is a highly-specialized program for maintaining the safety and dependability of the stockpile in a time without nuclear testing or the development of new weapons systems.[14] It has three main goals. First, the program supports the nuclear deterrent of the United States with a safe, secure, and reliable stockpile while downsizing the nuclear weapons inventory. Second, it aims to preserve the competencies of scientists in the weapons laboratories, utilizing a science-based approach. And third, it ensures that maintenance of the nation's nuclear deterrent is compatible with the nation's arms control efforts.[15]

The LEP and SSP work in conjunction by repairing or replacing components of nuclear weapons to ensure readiness of the weapons should they be called upon for military action. [16] To ensure readiness, the warheads are recertified annually, a process allowing them to remain in the stockpile beyond original expectations. Through the LEP, the NNSA has been able to recondition warheads that would have otherwise been dismantled and retired. The program maintains warheads by replacing deteriorated, non-functional components with newly-manufactured ones that, to the extent possible, match the original. The LEP also provides scientists with the opportunity to assess the impact of aging on radiation hardness during the lifetime of the overall weapon system.[17]

The SSP and LEP utilize nonnuclear experiments, computer simulations, and analyses of data from previous nuclear tests to evaluate and assure the stockpile's safety and efficacy.[18] By utilizing these tools, scientists are better able to assess the performance of the weapons and identify and fix problems. Directors of three National Laboratories (Los Alamos, Sandia, and Lawrence Livermore) say they understand more now about how nuclear weapons work than they did during the era of explosive testing.[19]

In the absence of testing, the annual certification process provides a formal appraisal of the nation's stockpile of nuclear warheads and bombs to the President.[20] The annual certification is an essential tool for ensuring confidence in the nuclear enterprise. This assessment is based on

a thorough evaluation of the stockpile, using scientific and engineering tools to assess safety and potential performance. The final memorandum to the President is the culmination of twelve months of surveillance, computer simulations, component-level experiments, and subcritical experiments.[21] To date, there have been no safety or reliability concerns with the stockpile. Therefore, supporters of the CTBT argue that underground testing does not need to resume, because the health of the stockpile can be safely and reliably maintained through LEP and SSP.

Computer Simulated Nuclear Weapons Testing

Several years ago, a computer simulation conducted at LLNL modeled the life cycle of a nuclear warhead from the moment it leaves storage to the moment of impact.[22] The test indicated flaws that could lead to catastrophic failure, meaning the weapon either would not produce the expected explosive yield or would produce nothing at all. Further investigation revealed errors in the way the weapon was handled prior to deployment. These flaws would not have been recognized without the assistance of computer simulation.

Since the early days of the Manhattan Project, nuclear scientists have relied on experimental data and simulations conducted with state-of-the-art computers. Computer modeling provides a better understanding of weapon physics and has resolved issues related to aging and design flaws.[23] Today, supercomputers used by the National Laboratories can replicate the physical impact of nuclear explosions with ultra-precise detail and incredible speed. These computers simulate molecular-scale reactions occurring within milliseconds.

Supercomputers perform three-dimensional interactive simulations, offering a candid view of the nuclear device's behavior and detailing what is happening at different points in time. The Advanced Simulation and Computing (ASC) program is a pillar of the SSP, and it allows scientists to take advantage of the capabilities of the new generation of supercomputers.[24] Scientists can now visualize and analyze each component of a nuclear weapon as it goes through the primary explosion. This provides deeper understanding of how thermonuclear explosions occur and how materials behave at extreme temperatures.

The ASC program has upgraded its computing capability with a supercomputer that can process 20 quadrillion calculations (called floating point operations) per second.[25] The faster the computer, the more detailed the information it produces and the less uncertainty in its data output. The ability to process large packages of information enables the computer to run verification programs to cross-reference data and predict the most likely outcomes. Weapon codes are fed into the computer, including the size and shape of the weapon's components, chemical makeup of materials, and the various phenomena acting inside the weapon during explosion.[26] Supercomputing has produced detailed insight that was never possible before.

With the U.S. moratorium on testing, the SSP and supercomputing have filled the void of information created by the lack of testing and new weapons development. Computer simulation allows the United States to maintain confidence in its nuclear stockpile.

The International Monitoring System

Two key components of the CTBT include monitoring for explosions consistent with the magnitude created by a nuclear detonation and the ability to verify the occurrence of an explosion. Annex 1 of the CTBT identifies the protocol for monitoring and verifying nuclear explosions and spells out the geographical coordinates for each monitoring site. Verification of nuclear weapons explosions has been a major sticking point for those opposed to the treaty. Advances in the IMS have addressed this concern.

The CTBT calls for the establishment of 337 monitoring facilities (321 monitoring stations and 16 radionuclide laboratories) located all over the world to constantly monitor for signs of nuclear explosions. Although the CTBT has not entered into force, 80% of the monitoring sites have already been activated.[27] Once established, each station must undergo a certification process to ensure it has implemented specific data and communication protocols, authentication devices, and interfaces with the Global Communications Infrastructure.[28] Additionally, each station must demonstrate operational practices consistent with IMS standards. Collected data is translated to the International Data Center at the CTBTO

headquarters in Vienna. Data is subsequently shared with member states (those who have signed the treaty).

The IMS uses four technologies to detect nuclear weapons explosions. Seismic monitoring measures shockwaves in the earth, hydroacoustic technology measures sound waves in the ocean, infrasound technology is used to detect low frequency sound waves emitted by large explosions, and radionuclide stations monitor radioactive particles and noble gases in the atmosphere.

When North Korea conducted its third nuclear weapon test in February 2013, sensors within the IMS detected seismic activity and alerted the international community that an explosion had occurred. Since naturally occurring seismic activity within North Korea is low, it is not likely the event was an earthquake. The first data were reported within one hour, enabling the CTBTO to determine the magnitude, location, and depth of the test.[29]

If an IMS station detects a nuclear explosion, member states can request an on-site inspection to gather evidence that will assist in a final determination of whether or not an explosion has actually taken place. However, on-site inspections can only be utilized if the treaty enters into force. Supporters of the CTBT are confident that while no treaty is 100% verifiable, the IMS will make it virtually impossible for any nation to explode a nuclear weapon without being detected.

The CTBT: Rationale against Ratification by the United States

Analysis of the Test Ban Treaty

Those in favor of the United States' ratification of the CTBT focus their argument on the successes of the SSP and LEP, the robust capabilities of supercomputers, and the ability of the IMS to detect nuclear explosions. However strong their arguments may be, there are inadequacies with each of these points, as these alternate approaches can never surpass the knowledge gained by an actual test. In addition to the political statement a nuclear test makes, testing provides real-time data about the weapon's reliability, how factors such as temperature and

delivery method impact its effectiveness, and how adjacent structures react.[30]

Complicating matters further is the fact that other countries continue along their pathway to nuclear armament. Iran has long been suspected of enriching uranium for the purpose of building a nuclear bomb and not for the sole purpose of providing energy, as it claims. Additionally, it is rumored that in return for funding to support Pakistan's nuclear weapons program, Saudi Arabia can claim some of those weapons at will.[31] As the face of the nuclear threats becomes even more unclear, now is not the time for the United States to commit to a legally binding ban on nuclear testing.

The CTBT is directed at banning all nuclear weapons testing, to include underground explosions. The inherent language within treaties is often a cause for debate, but the CTBT has created one of the longest debates in history. For starters, it is a treaty of unlimited duration, and the treaty does not provide a clear definition of testing, the very thing it proposes to ban.

In paragraph 1 of Article I, the treaty states, "each state party undertakes not to carry out any nuclear weapon test explosion or any other nuclear explosion."[32] During treaty negotiations, it was difficult for parties at the Conference for Disarmament to agree on what was actually banned. Debates endured about whether or not this language included low-yield testing and subcritical testing. As a consequence, there is much room for interpretation, and parties to the treaty must decide for themselves exactly what counts as a nuclear test. The Clinton Administration agreed to adopt a "zero-yield" interpretation of the treaty, meaning that it would agree to ban all nuclear explosions of any yield, but it would reserve the right to conduct subcritical tests. [33] Russia, on the other hand, is rumored to conduct hydronuclear tests that do produce a nuclear yield.[34]

If the United States ratifies the CTBT, it will be obligated to adhere to its "zero-yield" interpretation or face severe consequences in the international arena. Adversaries, and even allies who acknowledge a different definition of testing, could continue to conduct nuclear testing and develop new weapons technology while the United States would be forced to sit idly by and continue its efforts to maintain an outdated stockpile. This would leave the United States with a distinct military disadvantage.

The thought that ratification of the treaty by the United States would have a domino-like effect and induce other nations to follow suit is not as compelling as it sounds. The United States placed a self-imposed moratorium on nuclear explosions in 1992, and it has had virtually no impact on slowing down the advancement of nuclear programs, proliferation, or the testing schedule of some states. Russia and China have continued to make improvements to their nuclear weapons despite Russia's ratification of the treaty and China being a signatory. Russia has even modernized and expanded the types of warheads in its arsenal, and it has revised its doctrine to include the use of nuclear weapons in war to offset its declining conventional forces.[35]

If a desired second-order effect of the CTBT is to rally international opposition to proliferation, the moratorium on testing has not had that effect, either. The United States is the only nuclear-armed state that does not engage in modernization efforts. Russia has placed new emphasis on its nuclear weapons program, modernizing each leg of its nuclear triad, to include new ballistic missile submarines, new heavy ICBMs, and new low-yield warheads.[36]

Nor has America's ban on testing established a global normative view that all testing is taboo. Since 1992, North Korea has carried out three weapons tests: first in 2006, then 2009, and most recently in 2013. It also appears that North Korea is preparing for its fourth test. Satellite imagery revealed increased activity at its nuclear test site, suggesting it is making preparations for another explosion.[37] The fact that preparations are occurring less than a year after its latest test are suggestive of the aggressive nature of its nuclear program. If anything, the United States' moratorium on testing has been a green light to North Korea's nuclear program.

To some extent, nonproliferation efforts have been successful, because the nuclear arsenal of the United States provides a blanket of protection to its non-nuclear allies. However, just as the United States faces new and uncertain threats, so too do its allies. If the United States ratifies the CTBT, its allies will most likely question the legitimacy and capability of its extended deterrence. Some allies are already questioning the reliability of the U.S. blanket of protection. In response to tensions in the Middle East, Saudi Arabia and Turkey could make assertive efforts to acquire their own arsenals. One would also expect Japan and South Korea

to take up nuclear armament in response to North Korea's aggressive program. Couple the uncertainty about the health of the aging U.S. stockpile with a permanent ban on testing, and the United States could see its non-nuclear allies taking drastic steps to ensure their national security. Since their conventional forces alone are not enough to guarantee their autonomy, they will naturally turn to nuclear weapons.

As confidence in the U.S. nuclear umbrella erodes, the cooperative relationship the United States shares with its allies may also erode. In effect, ratification of the CTBT could induce proliferation, instead of preventing it. The Strategic Posture Commission report assesses that some U.S. allies believe their security needs can only be met with specific U.S. nuclear capabilities, and the lack of test readiness is viewed as evidence of the decline in the overall commitment of the United States to extended deterrence.[38]

There can never be a guarantee that the actions of the United States to ratify a test ban treaty will prompt other nations to either ratify that same treaty or totally abandon their efforts to adopt a nuclear weapons program. It is hopeful, at best, to think that the ratification by the United States would have such a profound diplomatic and symbolic effect. Even if the United States ratified the treaty today, it would not enter into force until all of the required 44 states had ratified it. Faced with a prospect where other countries are indeed proliferating, it would not be prudent to assume such a commitment at this time.

Life Support for an Aging Nuclear Weapons Stockpile

The United States is the only country in the nuclear "club" that does not have a nuclear modernization program. The nuclear weapons in the U.S. arsenal were designed and built with the specification they would be replaced every 10 to 15 years. Weapons in the current stockpile are based upon 1970s technology, and the average age of the weapons is 21 years. [39] Built for the Cold War, most of these weapons have long surpassed their intended life cycle and are not relevant to today's emerging threats. They were designed to destroy Soviet hardened targets, such as missile silos, and their delivery systems are not consistent with today's expectation of precision-guided systems.[40] Although the LEP and

SSP have allowed the weapons to surpass their life expectancy, it has not adapted the arsenal to new and emerging threats.

The moratorium on testing has driven the nuclear enterprise toward a stagnant, maintenance-oriented organization instead of the ambitious, innovative institution it once was. The ban on testing translates into a ban on new weaponry. The majority of nuclear testing was done for the verification of new weapon designs. [41] The incentive to develop new weapons is obsolete if the weapons cannot be tested. Ratification of the CTBT would end not only U.S. nuclear weapons testing but also put an end to the development of new nuclear weapons.

Even though the SSP and LEP have extended the life of the weapons in the stockpile, uncertainty about their reliability still looms. Instead of designing and testing new weapons, the arsenal is maintained by an indefinite life support system, leaving many to wonder how anyone could have confidence in the stockpile. The weapon systems are a conglomerate of thousands of intricate, precision-crafted parts, and they must interact in an explicit manner in order for the weapon to function. As the weapons age, plastics become brittle and crack, copper corrodes, and adhesive bonding becomes weak. Environmental factors such as temperature and humidity can impact the rate at which these materials begin to show signs of aging, but being in the presence of uranium and plutonium can greatly accelerate their decaying process.[42] Each of these could lead to catastrophic failure of the weapon which, unfortunately, may not be recognized until the weapon is deployed in defense of America's national security.

Aging is also seen in the plutonium core, the most important part of the warhead, which is responsible for the warhead's explosive power. Albeit a very slow process, plutonium will decay over time, losing both mass and energy, and the bomb either will detonate with a lower yield than what was intended or not detonate at all.[43] Likewise, the weapon systems are so precisely engineered that one cannot be certain how a twenty-something year old weapon will perform. Without testing, no one can say with certainty that either the SSP or the LEP is a success. The most definitive demonstration of reliability is an explosive test.

Modernization of the stockpile would have several advantages. First, it would allow the United States to incorporate relevant safety and security features into the weapon systems and provide the capability to

tailor the weapons to support the contemporary strategic environment. Second, the longer the delay in modernization, the higher the price tag will be. A recent study indicates the cost could be upwards of $352 billion over the next decade. [44] Third, modernization efforts would help maintain military effectiveness and reinforce the nation's commitment to its extended nuclear deterrent obligations. This brings along the added benefit of improving international relationships and stalling nuclear acquisitions of non-nuclear allies. Finally, a modernization program would enable the National Laboratories to recruit and retain technical expertise. The absence of testing and the lack of new weapons design have left the enterprise with a deficit of experienced personnel. The SSP has directly contributed to a decline in science and engineering capabilities. Instead of being able to follow a weapon through its entire lifecycle, engineers and scientists have become adept at analyzing and defining small variances in the stockpile based upon knowledge obtained more than two decades ago, when the United States was actively testing and developing new weapons.[45] This presents a real challenge if the CTBT is ratified, as the incentive to retain such expertise would be lost.

Although scientists would argue that computerized modeling has provided them with a better understanding of the weapon systems, the simulated tests can never fully replicate the knowledge gained from live, explosive testing. The information used in the virtual testing ground is comprised of information gained from previous explosive tests and guesswork. In designing the computer codes, scientists had to hypothesize and theorize about missing data points, thus leaving a margin of uncertainty in the simulated results.[46] Furthermore, it is risky to rely on the simulated tests as an indicator of reliability, because the aging weapons have undergone significant changes due to degradation and replacement of key components under LEP. Testing is the best way to ensure that repairs to the weapons have resolved known problems.

The Verification Regime: A Pipedream

Article IV of the CTBT establishes the verification regime, which includes on-site inspections and the IMS. Even with advances in the IMS, the treaty lacks any enforceable mechanisms. If an explosion is detected, a request can be submitted for an on-site inspection. However, a decision on

whether or not to approve the request is required within 96 hours, and it must have a consensus of at least 30 affirmative votes from members of the CTBTO Executive Council. Gathering a consensus on that level could be a diplomatic and political nightmare. The fact that "testing" is not explicitly defined by the treaty would challenge efforts for granting an on-site inspection, because the notion of what constitutes a nuclear test could be disputed. Thus, on-site inspections are not easily achievable, and therefore there is no guarantee that a nuclear explosion could be verified in the manner established by the CTBT.

If an inspection were granted, several more challenges would have to be overcome. Determining the exact location of the suspected explosion would be difficult. If the gases have vented or the explosion was not conducted to a certain underground depth, monitoring equipment would not be able to pinpoint the exact location. [47] Additionally, the treaty mandates that the inspection report must be transmitted to the CTBTO Executive Council no later than 25 days after the approval of the inspection. It is unrealistic to expect that a quorum of at least 30 member states would agree to the inspection, dispatch an inspection team, find the detonation site, gather and analyze the data, and submit a report in less than a month.

An additional challenge would be presented by those who would try to explode a device but escape detection. The seismic signal of an explosion can be reduced to a level below detection by conducting the explosion in a deep cavity located in high-strength, low-porosity rock, or in salt. [48] Careful selection of a testing site can offer a high level of confidence that the test will go undetected. For instance, the IMS was aware of North Korea's impending 2009 test, and even though North Korea made no attempt to hide it, the IMS did not detect any radionuclides following the explosion. [49] Another approach to cheating would be to simply explode a bomb without attribution. This scenario entails the placement of a nuclear device either on or in the ocean. The device can subsequently be detonated hours or days later. It would theoretically be detected by the IMS, but the guilty party could simply deny its culpability.[50]

Other challenges to the IMS come in the form of environmental and administrative obstacles. Site selection for an IMS station is very discriminatory. For example, the location for a seismic station must be

evaluated for vibrations caused by "wind, surf, traffic, and so on to ensure it is quiet enough for the station to be a good detector of seismic events."[51] For this reason, IMS stations are often located in remote, difficult-to-traverse locations. Also, once a station is operational, it will require maintenance, upgrades, or replacement as new technologies emerge. It can be a burdensome task to get to a station for routine maintenance. Additionally, administrative procedures within the host country often have to be negotiated through several agencies within that country before the site can be approved. Once the host country is ready to proceed with the station, the CTBT requires a legally-binding Facility Agreement between the host country and the CTBTO that grants the latter legal and administrative authority to conduct its work at the station.[52]

Aside from the obstacles encountered in setting up a monitoring station, the IMS and verification regime cannot be fully operational until the treaty enters into force. This would mean that countries such as India and Pakistan would have to ratify the treaty before IMS stations could be set up within their boundaries. It also means that the CTBTO has to coordinate its efforts and monitoring network in 89 different countries. Given all the caveats associated with activating the IMS, it is unlikely it will ever be fully operational.

Conclusion and Recommendations

While it is important for the United States to engage with the international community on the subject of nuclear arms control, U.S. policy makers would serve the country well to remember that deterrence is very much dependent upon credibility. There is no better way to demonstrate the proficiency of the U.S. nuclear enterprise and reinforce confidence than through an explosive test. Therefore, the first viable option is to, at a minimum, resume a rigorous underground nuclear testing schedule.

In the past, nuclear experiments were used to assess and evaluate the behavior of nuclear warheads and the properties of different materials used in the weapons. These experiments were invaluable for obtaining data that could be used in the development of new weapons or to assist in the design of future tests. Therefore, a second option would be to implement a limited testing schedule to provide scientists with the

opportunity to gather data. For example, an underground test every three to five years would net a wealth of data. It would help to insure that scientists understand the behavior of different weapon designs, instill confidence in the computer models used to predict the behavior of the weapons, and ultimately assess the effects of age-related changes in the current stockpile.

For decades, nuclear weapons have been an integral part of the national defense of the United States. Despite the best efforts of the SSP and LEP, the arsenal continues to age, and at some point in the future, safety and reliability of the arsenal can no longer be assured. By that time, the nuclear enterprise will be seriously deficient in expertise and infrastructure. Ratification of the CTBT would undermine not only the national security of the United States, but also that of its allies.

Appendix A
Status of Signature and Ratification

The CTBT will enter into force after the 44 designated states have ratified the treaty. As of 26 September 2013, 182 states have signed the treaty and 151 have ratified the treaty.[53] Of the 44 specified countries, only 35 have ratified the treaty.

* Signature and Ratification required for Treaty to enter into force

STATES	SIGNATURE	RATIFICATION
Afghanistan	24-SEP-2003	24-SEP-2003
Albania	27-SEP-1996	23-APR-2003
Algeria*	15-OCT-1996	11-JUL-2003
Andorra	24-SEP-1996	12-JUL-2006
Angola	27-SEP-1996	
Antigua and Barbuda	16-APR-1997	11-JAN-2006
Argentina*	24-SEP-1996	04-DEC-1998
Armenia	01-OCT-1996	12-JUL-2006
Australia*	24-SEP-1996	09-JUL-1998
Austria*	24-SEP-1996	13-MAR-1998
Azerbaijan	28-JUL-1997	02-FEB-1999
Bahamas	04-FEB-2005	30-NOV-2007
Bahrain	24-SEP-1996	12-APR-2004
Bangladesh*	24-OCT-1996	08-MAR-2000
Barbados	14-JAN-2008	14-JAN-2008
Belarus	24-SEP-1996	13-SEP-2000
Belgium*	24-SEP-1996	29-JUN-1999
Belize	14-NOV-2001	26-MAR-2004
Benin	27-SEP-1996	06-MAR-2001
Bhutan		
Bolivia	24-SEP-1996	04-OCT-1999
Bosnia and Herzegovina	24-SEP-1996	26-OCT-2006
Botswana	16-SEP-2002	28-OCT-2002
Brazil*	24-SEP-1996	24-JUL-1998
Brunei Darussalam	22-JAN-1997	10-JAN-2013
Bulgaria*	24-SEP-1996	29-SEP-1999
Burkina Faso	27-SEP-1996	17-APR-2002
Burundi	24-SEP-1996	24-SEP-2008
Cambodia	26-SEP-1996	10-NOV-2000

Cameroon	16-NOV-2001	06-FEB-2006
Canada*	24-SEP-1996	18-DEC-1998
Cape Verde	01-OCT-1996	01-MAR-2006
Côte d'Ivoire	25-SEP-1996	11-MAR-2003
Central African Republic	19-DEC-2001	26-MAY-2010
Chad	08-OCT-1996	08-FEB-2013
Chile*	24-SEP-1996	12-JUL-2000
China*	24-SEP-1996	
Colombia*	24-SEP-1996	29-JAN-2008
Comoros	12-DEC-1996	
Congo	11-FEB-1997	
Cook Islands	05-DEC-1997	06-SEP-2005
Costa Rica	24-SEP-1996	25-SEP-2001
Croatia	24-SEP-1996	02-MAR-2001
Cuba		
Cyprus	24-SEP-1996	18-JUL-2003
Czech Republic	12-NOV-1996	11-SEP-1997
Democratic People's Republic of Korea*		
Democratic Republic of the Congo*	04-OCT-1996	28-SEP-2004
Denmark	24-SEP-1996	21-DEC-1998
Djibouti	21-OCT-1996	15-JUL-2005
Dominica		
Dominican Republic	03-OCT-1996	04-SEP-2007
Ecuador	24-SEP-1996	12-NOV-2001
Egypt*	14-OCT-1996	
El Salvador	24-SEP-1996	11-SEP-1998
Equatorial Guinea	09-OCT-1996	
Eritrea	11-NOV-2003	11-NOV-2003
Estonia	20-NOV-1996	13-AUG-1999
Ethiopia	25-SEP-1996	08-AUG-2006
Fiji	24-SEP-1996	10-OCT-1996
Finland*	24-SEP-1996	15-JAN-1999
France*	24-SEP-1996	06-APR-1998
Gabon	07-OCT-1996	20-SEP-2000
Gambia	09-APR-2003	
Georgia	24-SEP-1996	27-SEP-2002
Germany*	24-SEP-1996	20-AUG-1998

Ghana	03-OCT-1996	14-JUN-2011
Greece	24-SEP-1996	21-APR-1999
Grenada	10-OCT-1996	19-AUG-1998
Guatemala	20-SEP-1999	12-JAN-2012
Guinea	03-OCT-1996	20-SEP-2011
Guinea-Bissau	11-APR-1997	24-SEP-2013
Guyana	07-SEP-2000	07-MAR-2001
Haiti	24-SEP-1996	01-DEC-2005
Holy See	24-SEP-1996	18-JUL-2001
Honduras	25-SEP-1996	30-OCT-2003
Hungary*	25-SEP-1996	13-JUL-1999
Iceland	24-SEP-1996	26-JUN-2000
India*		
Indonesia*	24-SEP-1996	06-FEB-2012
Iran (Islamic Republic of)*	24-SEP-1996	
Iraq	19-AUG-2008	26-SEP-2013
Ireland	24-SEP-1996	15-JUL-1999
Israel*	25-SEP-1996	
Italy*	24-SEP-1996	01-FEB-1999
Jamaica	11-NOV-1996	13-NOV-2001
Japan*	24-SEP-1996	08-JUL-1997
Jordan	26-SEP-1996	25-AUG-1998
Kazakhstan	30-SEP-1996	14-MAY-2002
Kenya	14-NOV-1996	30-NOV-2000
Kiribati	07-SEP-2000	07-SEP-2000
Kuwait	24-SEP-1996	06-MAY-2003
Kyrgyzstan	08-OCT-1996	02-OCT-2003
Lao People's Democratic Republic	30-JUL-1997	05-OCT-2000
Latvia	24-SEP-1996	20-NOV-2001
Lebanon	16-SEP-2005	21-NOV-2008
Lesotho	30-SEP-1996	14-SEP-1999
Liberia	01-OCT-1996	17-AUG-2009
Libya	13-NOV-2001	06-JAN-2004
Liechtenstein	27-SEP-1996	21-SEP-2004
Lithuania	07-OCT-1996	07-FEB-2000
Luxembourg	24-SEP-1996	26-MAY-1999
Madagascar	09-OCT-1996	15-SEP-2005
Malawi	09-OCT-1996	21-NOV-2008

Malaysia	23-JUL-1998	17-JAN-2008
Maldives	01-OCT-1997	07-SEP-2000
Mali	18-FEB-1997	04-AUG-1999
Malta	24-SEP-1996	23-JUL-2001
Marshall Islands	24-SEP-1996	28-OCT-2009
Mauritania	24-SEP-1996	30-APR-2003
Mauritius		
Mexico*	24-SEP-1996	05-OCT-1999
Micronesia, Federated States of	24-SEP-1996	25-JUL-1997
Monaco	01-OCT-1996	18-DEC-1998
Mongolia	01-OCT-1996	08-AUG-1997
Montenegro	23-OCT-2006	23-OCT-2006
Morocco	24-SEP-1996	17-APR-2000
Mozambique	26-SEP-1996	04-NOV-2008
Myanmar, Republic of the Union of	25-NOV-1996	
Namibia	24-SEP-1996	29-JUN-2001
Nauru	08-SEP-2000	12-NOV-2001
Nepal	08-OCT-1996	
Netherlands*	24-SEP-1996	23-MAR-1999
New Zealand	27-SEP-1996	19-MAR-1999
Nicaragua	24-SEP-1996	05-DEC-2000
Niger	03-OCT-1996	09-SEP-2002
Nigeria	08-SEP-2000	27-SEP-2001
Niue	09-APR-2012	
Norway*	24-SEP-1996	15-JUL-1999
Oman	23-SEP-1999	13-JUN-2003
Pakistan*		
Palau	12-AUG-2003	01-AUG-2007
Panama	24-SEP-1996	23-MAR-1999
Papua New Guinea	25-SEP-1996	
Paraguay	25-SEP-1996	04-OCT-2001
Peru*	25-SEP-1996	12-NOV-1997
Philippines	24-SEP-1996	23-FEB-2001
Poland*	24-SEP-1996	25-MAY-1999
Portugal	24-SEP-1996	26-JUN-2000
Qatar	24-SEP-1996	03-MAR-1997
Republic of Korea*	24-SEP-1996	24-SEP-1999
Republic of Moldova	24-SEP-1997	16-JAN-2007

Romania*	24-SEP-1996	05-OCT-1999
Russian Federation*	24-SEP-1996	30-JUN-2000
Rwanda	30-NOV-2004	30-NOV-2004
Saint Kitts and Nevis	23-MAR-2004	27-APR-2005
Saint Lucia	04-OCT-1996	05-APR-2001
Saint Vincent and the Grenadines	02-JUL-2009	23-SEP-2009
Samoa	09-OCT-1996	27-SEP-2002
San Marino	07-OCT-1996	12-MAR-2002
Sao Tome and Principe	26-SEP-1996	
Saudi Arabia		
Senegal	26-SEP-1996	09-JUN-1999
Serbia	08-JUN-2001	19-MAY-2004
Seychelles	24-SEP-1996	13-APR-2004
Sierra Leone	08-SEP-2000	17-SEP-2001
Singapore	14-JAN-1999	10-NOV-2001
Slovakia*	30-SEP-1996	03-MAR-1998
Slovenia	24-SEP-1996	31-AUG-1999
Solomon Islands	03-OCT-1996	
Somalia		
South Africa*	24-SEP-1996	30-MAR-1999
South Sudan		
Spain*	24-SEP-1996	31-JUL-1998
Sri Lanka	24-OCT-1996	
Sudan	10-JUN-2004	10-JUN-2004
Suriname	14-JAN-1997	07-FEB-2006
Swaziland	24-SEP-1996	
Sweden*	24-SEP-1996	02-DEC-1998
Switzerland*	24-SEP-1996	01-OCT-1999
Syrian Arab Republic		
Tajikistan	07-OCT-1996	10-JUN-1998
Thailand	12-NOV-1996	
The former Yugoslav Republic of Macedonia	29-OCT-1998	14-MAR-2000
Timor-Leste	26-SEP-2008	
Togo	02-OCT-1996	02-JUL-2004
Tonga		
Trinidad & Tobago	08-OCT-2009	26-MAY-2010
Tunisia	16-OCT-1996	23-SEP-2004

Turkey*	24-SEP-1996	16-FEB-2000
Turkmenistan	24-SEP-1996	20-FEB-1998
Tuvalu		
Uganda	07-NOV-1996	14-MAR-2001
Ukraine*	27-SEP-1996	23-FEB-2001
United Arab Emirates	25-SEP-1996	18-SEP-2000
United Kingdom of Great Britain and Northern Ireland*	24-SEP-1996	06-APR-1998
United Republic of Tanzania	30-SEP-2004	30-SEP-2004
United States of America*	24-SEP-1996	
Uruguay	24-SEP-1996	21-SEP-2001
Uzbekistan	03-OCT-1996	29-MAY-1997
Vanuatu	24-SEP-1996	16-SEP-2005
Venezuela (Bolivarian Republic of)	03-OCT-1996	13-MAY-2002
Viet Nam*	24-SEP-1996	10-MAR-2006
Yemen	30-SEP-1996	
Zambia	03-DEC-1996	23-FEB-2006
Zimbabwe	13-OCT-1999	

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CHAPTER 10

Nuclear Modernization and the Non-Proliferation Treaty: Compliance or Compromise

Shelley Bischoff Kavlick

The most terrifying invention known to man is the nuclear weapon. Society's fear of these awesome devices is evident by the unwillingness to use these weapons over the past seven decades. During the Cold War, the stakes were too high for the United States or Soviet Union to even approach their use. Despite the end of the Cold War, nuclear proliferation has been on the rise as countries pursue nuclear programs for a variety of motives that include energy, security, or influence. In order to prevent the spread of nuclear weapons and ultimately achieve complete disarmament, the United States and other countries joined together in the late 1960s to create the Treaty on the Non-Proliferation of Nuclear Weapons (NPT). President Barack Obama proclaimed America's renewed commitment to the NPT during his acclaimed speech at Prague in April of 2009. International cooperation for the NPT is hopeful at best and does not address the realities of living in a global nuclear age where nations that have nuclear weapons will never relinquish them, while others that want nuclear weapons will continue to pursue them. The day and age of nuclear technology is here to stay, which is why Nuclear Weapons States (NWS) must responsibly secure and maintain their respective nuclear arsenals in accordance with the NPT.

The U.S. nuclear enterprise has entered a new era where weapons downsizing, coupled with an aging inventory, may compromise the credibility of America's strategic deterrence and extended assurance. The current NPR calls for a "credible modernization plan necessary to sustain the nuclear infrastructure and support our nation's nuclear deterrent."[1]

This paper will examine whether the United States can modernize and develop nuclear weapons and delivery platforms while remaining compliant with the NPT. The following discussion will review the NPT and other relevant treaties and documents for a baseline on U.S. nuclear weapons policy.

Treaty on the Non-Proliferation of Nuclear Weapons

The NPT entered into force on 5 March 1970 under the agreement of three main pillars: prevent the spread of nuclear weapons and weapons technology (Articles I and II); foster the peaceful uses of nuclear energy (Articles III, IV and V); and further the goal of disarmament (Article VI).[2] The NPT has been ratified by 189 nations. (North Korea withdrew when they declared their nuclear program, and India, Pakistan, and Israel have not signed the treaty).[3]

The IAEA is responsible for monitoring member states' compliance with non-proliferation safeguards. While the IAEA has demonstrated success in identifying proliferation violations, the utopian goals of the NPT prove difficult to achieve in a technically-oriented and politically-charged security environment. The IAEA lacks the authority and capacity to safeguard against proliferation. NPT inspections require consent from inspected states and only occur at declared sites. In 1997, after the discovery of Iraq's clandestine nuclear weapons program, stronger inspection protocols were added to the original 1972 Safeguards Agreement. However, only 128 of 189 NPT member states have adopted these requirements.[4]

While the NPT is an internationally-recognized treaty, it may represent nothing more than good-faith rhetoric. Article X of the NPT provides the option for member states to withdraw at any time. Furthermore, original provisions call for an NPT Review Conference twenty-five years after the date of NPT entry into force to determine whether to indefinitely extend the treaty. Member states met as prescribed in 1995 and decided to conduct NPT Review Conferences every five years. According to the 2013 edition of the *2010 NPT Action Plan Monitoring Report*, NPT member states, and specifically the NWS, show little interest or ability to support the comprehensive 64-point Action Plan,

and much work remains to fully implement it by the next Review Conference in 2015.[5]

The notion that the NPT equitably applies to Non-Nuclear Weapons States (NNWS) is a matter of perspective and trust between NNWS and NWS. The IAEA safeguards and inspections apply only to NNWS. There remains a perception of a double standard between NNWS and NWS. NPT prohibitions and obligations fall on NNWS to forego acquisition of nuclear weapons, while NWS are expected to negotiate disarmament without threat of consequences if they fail to do so.[6] The grand bargain that is at the heart of the NPT presents a dilemma for NNWS, who must refrain from developing nuclear weapons but see NWS continuing to rely on their nuclear arsenals. The original NWS – the five permanent members (P5) of the UN Security Council (United States, Russia, United Kingdom, France, and China) – plus Israel, India, Pakistan, and North Korea actively maintain and modernize their nuclear arsenals with no plans to abolish the weapons. The intent of NWS to remain armed with nuclear weapons is evident by their active modernization efforts and reluctance to ratify the CTBT.

Comprehensive Nuclear-Test-Ban Treaty

In an effort to promote nuclear non-proliferation by banning nuclear testing, the UN General Assembly adopted the CTBT in 1996, nearly two decades after the NPT entered into force. The CTBT specifically bans nuclear weapon tests and other nuclear-related explosions. The treaty will enter into force once signed and ratified by the United States and other member states with either nuclear power or research reactors. As of June 2013, of the 44 required states, 41 have signed and 36 have ratified the CTBT. The United States has signed but not ratified the treaty.[7] The United States has not conducted nuclear testing since 1992, while other NWS have tested as recently as 2013 (Russia in 1990, India and Pakistan in 1998, North Korea in 2013).[8] Advocates of the CTBT assert that, by the treaty entering into force, positive steps will be taken to fulfill the intent of Article VI of the NPT. Perceived inequities between NNWS and NWS would be mitigated as the P5 states agree to forego the right to develop and test new and sophisticated warheads.[9]

While the current Administration is intent on ratifying the CTBT, Congress remains divided on the merits of this treaty.

The National Academy of Sciences (NAS) March 2012 report, *The Comprehensive Nuclear-Test-Ban Treaty: Technical Issues for the United States,* provides some considerations associated with the CTBT. According to the NAS, "technical capabilities for maintaining the stockpile absent nuclear explosion testing are better now than anticipated." [10] Modern research and development efforts may possibly eliminate reliance on explosive tests to ensure reliability of legacy nuclear weapons. However, like criticism of the NPT, "there is currently no mechanism that would enable Congress to assess whether CTBT safeguards were being fulfilled after entry into force."[11] The United States, like other NWS, is inherently responsible to the international community to maintain safe and reliable nuclear arsenals. Diplomatic pressure to reduce nuclear stockpiles is forcing USG policy makers to address the relevance of nuclear weapons with respect to the current and future national security environment. American policy on nuclear tests and modernization can be understood by examining the NPR.

Nuclear Posture Review

The NPR is the roadmap for the U.S. nuclear enterprise based on the policies of the current Administration. The 2010 NPR expands upon President Obama's address to the international community at Prague in 2009 in which he communicated his greater vision of nuclear weapon disarmament while advocating for the national security interests of the United States and its allies. More specifically, the NPR states, "fundamental changes in the international security environment…enable us to fulfill those objectives…with reduced reliance on nuclear weapons…without jeopardizing our traditional deterrence and reassurance goals."[12] Top priority for U.S. nuclear security is the prevention of nuclear proliferation and nuclear terrorism to be achieved through three identified objectives. First, the NPR aims to bolster the non-proliferation regime through the NPT. Second, it seeks to accelerate efforts to secure vulnerable nuclear materials worldwide. Third, it aims to pursue arms control efforts through international treaties.[13] Such treaties include the

CTBT and the New START Treaty that limits U.S. and Russian inventories to 1,550 deployed strategic nuclear warheads for each side.[14]

The NPR states that non-proliferation and arms reduction will be achieved by America's commitment to the ratification of international treaties and investment in the aging nuclear infrastructure. Then-Secretary of Defense Robert Gates subsequently called for $5 billion to be transferred from DOD to DOE for warhead life extension in support of a modernization plan for nuclear deterrence.[15] Based on language in the current NPR, it is clear that the United States will proceed with support of nuclear non-proliferation efforts while seeking innovative approaches to keeping a formidable deterrent to nuclear threats. The following discussion defines the nuclear employment strategy.

Nuclear Employment Strategy

In 2011, in accordance with Section 491 of 10 U.S. Code, the Secretary of Defense led an interagency follow-on analysis of the 2010 NPR known as the *Report on Nuclear Employment Strategy*. The report reiterated President Obama's directive to achieve a credible nuclear deterrent for both the U.S. and its allies with a reduced nuclear force structure. DOD and DOE recommend a three-pronged approach to hedge against risk to the credibility of the U.S. nuclear stockpile:

1. Maintain ample non-deployed nuclear weapons to offset technical failure of any weapon or delivery system by providing intra-leg and inter-leg options (i.e., interchangeability among triad warheads);
2. Maintain legacy weapons until confidence in life-extension programs is achieved;
3. Ensure a right-sized and ready non-deployed weapons hedge for flexibility to respond to geopolitical events that alter deployed force requirements.[16]

Investment in the U.S. nuclear enterprise is a resonating theme in the NPR and follow-on nuclear employment strategy. America's nuclear weapons policy not only provides strategic direction and resource allocation

guidance to the nuclear enterprise, it also informs the international community on U.S. nuclear deterrence priorities.

Relevance of USG Nuclear Policy to the International Community

The current Administration is actively engaging with the international community on its nuclear weapons policy through various mechanisms as discussed (e.g., NPT, CTBT, New START, NPR), for a variety of reasons. First and foremost, the United States is the premier nuclear superpower in both force structure and capability. Peer P5 NWS are likely to mirror-image what the United States is doing as the global nuclear leader. While nuclear non-proliferation is the collective responsibility of the international community, America is looked upon to take the initiative for others to follow. The 2010 NSS declares that the United States will "pursue the goal of a world without nuclear weapons."[17] The current Administration recognizes the role expected of the United States by fellow NPT member states to lead the cause against non-proliferation. The dilemma that inherently lies in total nuclear disarmament is that as long as known states and possibly non-state actors (NSA) hold nuclear weapons, nuclear deterrence will remain a national security concern. The NSS goes on to assert that there is "no greater threat to the American people than weapons of mass destruction, particularly the danger posed by the pursuit of nuclear weapons by violent extremists and their proliferation to additional states." [18] For these reasons, the NSS further states that the United States will invest in modernization of the nuclear arsenal to ensure a "safe, secure and effective stockpile" without new production.[19] We can expect that the USG will continue to invest in the nuclear enterprise to keep it as a relevant deterrent. However, how will a reduced nuclear force structure affect U.S. nuclear deterrence? The answer is partly dependent on the non-proliferation regime and the perception of a credible extended deterrent.

The NSS validates America's commitment to nuclear non-proliferation by extending a negative security assurance to non-nuclear NPT member states: the United States will not to use or threaten the use of nuclear weapons against NNWS that are in good standing with their NPT obligations.[20] The USG assures partner nations that, if they agree not to

proliferate, America's nuclear force structure will maintain a credible extended deterrent against an adversarial nuclear strike. Multilateral alliances and bilateral agreements could be jeopardized if America's declining nuclear force structure were perceived as less than credible. By communicating the intent to invest in the modernization of the nuclear enterprise, the United States may not only maximize capability with a reduced arsenal but also mitigate a negative perception of extended deterrence credibility. Another key element to nuclear deterrence is how current and emerging nuclear powers interpret the credibility of U.S. nuclear policy.

Nuclear weapons stabilize the security environment by nature of their deterrence. The NPR clearly supports this theory, stating that America will support "strategic stability through an assured second strike capability."[21] Nuclear weapons remain the ultimate deterrent against total war between states with assets that can be held at risk.[22] Furthermore, nuclear weapons are an attractive solution for states that face significant security threats and cannot afford large conventional militaries. Nations such as Pakistan and India balance the threat of rival nuclear states with their own deterrent weapons. North Korea and Iran seek proportionate influence and seek to balance power with other nuclear-armed states within their respective regions. (North Korea is to U.S. Forces Korea as Iran is to Israel). The nuclear club is growing significantly larger and more unstable, and the U.S. response is to reduce its nuclear force structure and modernize the nuclear enterprise. While a declining nuclear inventory may signal good faith towards arms reduction, modernization efforts can be perceived as a silent arms race among NWS and possibly provoke proliferation. What is certain is that the post-Cold War nuclear landscape is no longer bipolar.

The global nuclear security environment is growing ever more complex and dynamic as nuclear access potentially becomes more accessible to states and NSA. The National Defense University Center for the Study of Weapons of Mass Destruction characterizes the world with high nuclear latency. It asserts that while nuclear weapons programs are the greatest threat to nuclear proliferation, other latent possibilities just below this threshold or capability ought to be considered.[23] Advanced technologies that enable states to develop nuclear programs for peaceful purposes can lend to processes that conceal weaponry advancement and,

moreover, shorten lead and reaction times for developing nuclear weapons. This movement is not limited to recognized states alone. The possibility of NSA and individuals proliferating nuclear technology is a dangerous reality. Consider the fall-out of nuclear black-market sales by the Pakistani nuclear scientist Dr. AQ Kahn, who provided nuclear weapons technology to North Korea and Iran. Given the lack of legally-binding consequences of member states withdrawing from the NPT to develop indigenous nuclear weapons programs, nuclear latency is ripe for proliferation should regional security become a concern for NNWS.

The phenomenon of nuclear latency and the continued threat of near-peer competitors are incentives for NWS to modernize their nuclear programs. NWS all maintain and plan to modernize their weapons. Global Zero estimates that the nine nuclear-armed nations invested $104.9 billion on their combined nuclear arsenals in 2011.[24] While USG policy makers have lobbied Congress for investment funds, the bureaucracy to modernize is a slow-going process. Former Secretary of Defense Gates is quoted as saying, "no one has designed a new nuclear weapon in the United States since the 1980s, and no one has built a new one since the 1990s…the United States is the only declared nuclear power that is neither modernizing its nuclear arsenal nor has the capability to produce a new nuclear warhead."[25] The relevancy of the U.S. nuclear enterprise is in question. Cold War era nuclear weaponry designed for high-yield performance may not be the right deterrent for next-generation nuclear threats that include both nation states and extremist NSA. There is also growing concern over preserving American nuclear intellectual property. As scientists and engineers with practical nuclear design and test experience from the 1980s and 1990s near retirement, the United States will lose a generation of nuclear weapons expertise.[26] This dilemma merits further examination of whether the nuclear enterprise should maintain the status quo or modernize to mitigate risk.

Maintaining the Status Quo

The Cold War experience reinforced the nuclear taboo such that the escalation of nuclear weapons averted their actual use out of fear of global annihilation. In 1991, the United States and Russia made a commitment to an arms reduction treaty by agreeing to the START Treaty,

and they renewed this pledge some 20 years later by ratifying the New START Treaty in 2011. Since the end of the Cold War, only four nations outside of the original P5 countries have acquired nuclear weapons, indicating the relatively slow pace of nuclear weapon proliferation. Furthermore, there is growing international support of nuclear disarmament. The NPT has been ratified by 189 governments, and the CTBT has been ratified by 36 of 44 required nations to enter into force. According to a 2008 world public opinion poll, 77 percent of Americans are in favor of banning nuclear weapons.[27] The current Administration envisions a world without nuclear weapons as prescribed in the NPT and is committed to ratification of the CTBT. As the global steward of nuclear non-proliferation, the United States may influence other NWS to abandon their modernization efforts by foregoing its own modernization program. Modernization of the U.S. nuclear enterprise would be perceived as contradictory to signed treaties and could possibly incite a nuclear arms race. History has shown that America continues to deter other countries from attack with its current nuclear arsenal.

Advancements in conventional weapons can complement strategic deterrence provided by the current nuclear arsenal. Technology has produced more accurate and lethal conventional weapons that do not hold the same public scrutiny for use as nuclear weapons in war. Nuclear scientists and engineers could apply their technical skills toward developing conventional weapons with better kinetic effects. The likelihood of the United States using nuclear weapons again remains to be seen. USG policy on nuclear second strike reinforces the notion that nuclear weapons will only be used in retaliation of a deliberate nuclear attack against America or its allies. Continued development and revolutions in conventional weapons technology do not present a perceived compromise to America's commitment to international non-proliferation treaties. Modernization of conventional weapons does not counter the principles behind the NPT, but rather deemphasizes focus on the prestige of nuclear weapons. The status quo argument is feasible so long as the national security landscape remains relatively unchanged with predictable threats. However, today's threats grow into tomorrow's fears as global security concerns are constantly evolving. The nuclear enterprise should remain relevant not only to current but future security challenges.

Modernize to Mitigate Risk

Critics of nuclear weapon modernization may question why the United States should reinvest in its nuclear enterprise when nuclear weapons have not been used in almost 70 years. The counter argument would be that nuclear weapons have actually been used as a strategic deterrent for nearly seven decades. In fact, nuclear weapons have been so successful that they have not been used in an attack on another country since 1945. There is a clear distinction between nuclear proliferation, where states compete to acquire the same nuclear capability, and nuclear deterrence, when one state stops another state from using nuclear weapons. While the NPT aims to reduce the overall number of nuclear weapons in the world, it is important to recognize that it does not prevent the use of nuclear weapons. Former Secretary of State Hillary Clinton has said, "the nuclear status quo is neither desirable nor sustainable…it gives other countries the motivation or excuse to pursue their own nuclear programs."[28] A representative from the State Department Bureau of Arms Control, Verification, and Compliance states that production (modernization included) of new nuclear weapons is not banned under international law.[29] The USG position is to adhere to the intent of the CTBT while attempting to affirm the integrity of current nuclear weapons without resorting to underground nuclear explosive testing.[30] If technology could support modernization of nuclear components within a warhead without explosive testing, then modernization would not violate the intent of the CTBT. A relevant nuclear weapons program is a tool of counter proliferation only if it remains a credible deterrent to dissuade countries from acquiring or transferring nuclear weapons.

So the question that lies herein is: in order to retain a credible strategic deterrent, can the United States modernize without violating the intent of the NPT? Earlier pursuits for nuclear modernization were explored under the Reliable Replacement Warhead (RRW) program funded by Congress between 2004 and 2008, in which the NNSA researched the feasibility of replacing aging warheads in the nuclear stockpile.[31] The RRW program intended to make nuclear warheads easier to manufacture, make them more environmentally friendly, increase margins for reliability, and eliminate underground certification testing.[32] The goal of the program centered on the versatility of both a common

platform warhead and a modifiable nuclear yield.[33] Skeptics believed that confidence in the RRW could not be proven without nuclear testing, while others saw merit in the program as an opportunity to train the next generation of nuclear weapons designers. The Obama Administration eventually cancelled the program in 2009 due to lack of funding. Thereafter, modernization efforts for the nuclear enterprise became a function of the LEP.

The NPR states that the USG will not develop new nuclear warheads or conduct nuclear testing and will use only those nuclear components from previously-tested designs.[34] Warhead updates would be generated from nuclear components that are refurbished, reused, or replaced. The NPR recommends LEPs for W-76 (for SLBMs), W-78 (for ICBMs), and B-61 (for bombers and DCA) warheads. U.S. policy limitations on new design testing may call into doubt the integrity of LEP warheads. Former Secretary of Defense Gates expressed concern with the LEP as a long-term solution for the nuclear arsenal, stating, "with every adjustment, we move farther away from the original design that was successfully tested when the weapon was first fielded."[35] At what point will America's inventory of nuclear warheads be no longer certifiable? *The Report on Nuclear Employment Strategy* calls for the DOD to maintain legacy warheads until confidence is reached for each LEP. In essence, nuclear stockpile reductions may be delayed due to the progress and outcome of the LEP.

More recent developments to modernize the nuclear stockpile include the 3+2 Plan. The joint DOD and DOE Nuclear Weapons Council endorsed a 25-year path toward a long-term stockpile solution. The 3+2 Plan proposes warhead replacement and interoperability among three ballistic missile warheads (for SLBMs and ICBMs) and two air-delivered warheads (for cruise missiles and bombs). [36] Such an initiative would require design modification, possibly inciting political and legal backlash to new weapons development. However, new technology has evolved to certify warheads inside the laboratory in lieu of field testing. Modernization offers the prospects of engineering right-sized nuclear warheads with flexibility to meet the security challenges of today and tomorrow without increasing the size of the nuclear arsenal. America's pool of nuclear expertise would not be at risk of atrophy; rather, modernization can train the next generation of nuclear scientists and

engineers. The United States could remain compliant with the New START Treaty by replacing antiquated warheads with reengineered warheads on a one-for-one basis. Also, the United States could possibly seek further arms reductions with more capable nuclear warheads providing increased accuracy, lower yields, and reduced collateral damage. More significantly, the 3+2 Plan would give Congress more options whether or not to ratify the CTBT.

Approach to Policy and Recommendations

USG policy makers must stay the course with America's renewed commitment to the nuclear enterprise in order for it to remain a credible strategic deterrent. The nuclear status quo is based on a legacy Cold War security strategy that lacks the flexibility and confidence to deter current and emerging security threats. A relevant twenty-first century nuclear enterprise will signal to our allies in extended deterrence and peers in strategic deterrence that America will remain an unrivaled global nuclear leader. Modernization will improve the adaptability of the nuclear arsenal by developing lower-yield nuclear weapons with tailored options for the National Command Authority to respond to an array of security threats. Technology now permits new warhead certification in controlled laboratory conditions without violating the CTBT. Certified confidence in warhead accuracy and collateral damage would enable a leaner nuclear arsenal.

The alternative viewpoint is that America's modernization efforts may incite an arms race with members of the non-proliferation regime. NWS are already actively updating their nuclear arsenals. Perhaps the United States approach to modernization by right-sizing nuclear weapons would be mirror-imaged by other NWS, incentivizing arms reduction through improved efficiencies in nuclear force structure. America's modernization efforts should include diplomatic engagement with the UN Security Council to minimize international political backlash and perception of proliferation. Transparent development and strategic dialogue with the IAEA, NWS, and NNWS will communicate the United States' intent to be a global leader in nuclear weapons efficiency and arms reduction.

The United States will remain compliant with the NPT should it pursue modernization of the U.S. nuclear enterprise. America would continue to lead non-proliferation efforts by investing in aging nuclear warheads to become a relevant and credible extended deterrent for its allies while demonstrating the highest of standards by safeguarding the advanced technology. The United States can continue to assist NNWS to foster their own peaceful nuclear energy programs. The USG will advance President Obama's goal toward further nuclear disarmament by replacing antiquated warheads with reengineered warheads, improving the performance and efficiency of the nuclear arsenal, and implementing stockpile reductions that may inspire other NWS to follow-suit. America's modernization efforts will signal to the non-proliferation regime that the USG remains committed to the tenants of the NPT while maintaining a safe and responsible nuclear force.

Follow-on nuclear policy debate should examine nuclear modernization as a symbiotic relationship between nuclear and conventional weapons. Would continued advancements in the precision and lethality of conventional weapons produce the same effects as nuclear weapons? If so, how much should the USG balance investment between revolutionizing conventional weapons and modernizing the nuclear enterprise? These are difficult questions that senior policy makers should consider in an approach to informing the 2014 NSS and addressing the security challenges that lie ahead.

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CHAPTER 11

Is There Future Utility in Nuclear Weapons? Nuclear Weapons Save Lives

Robert A. Hoskins

Nuclear weapons serve the purpose of dissuading man's most violent tendencies. However, the political utility of nuclear weapons has come under increased scrutiny since the end of the Cold War. With the Soviet Union and the United States no longer at an alert standoff, some believe nuclear weapons no longer serve any purpose relative to national security. This is not the case. Those who believe in nuclear disarmament are discounting the historical reality that the world has been safe from great-power war since nuclear weapons have become part of the military arsenal. Not only have nuclear weapons deterred nuclear war, but they have deterred, and will continue to deter, large-scale conventional war in a dangerous world. This paper will examine, in three sections, the political utility of nuclear weapons.

In the first section, there will be an examination of current arguments in support of nuclear disarmament. There are myriad voices, authors, and think tanks pushing an agenda of a global nuclear "zero." First, consideration will be given to those who believe that nuclear weapons no longer serve a purpose and that the United States should lead the world into nuclear disarmament. Their prevailing arguments will be outlined and analyzed. There are those who argue that nuclear weapons only deter nuclear war. This is the idea that in a world without a nuclear threat, there is no utility for anyone to have nuclear weapons, and the United States should be the world's leader toward disarmament. Second, there are those who believe that nuclear weapons are a cost-prohibitive portion of the military arsenal and that United States' treasure should be spent elsewhere. Third, some believe that nuclear weapons create instability in the world and that nuclear proliferation, particularly among

rogue states and/or violent non-state actors, is the greatest threat to U.S. national security in the current day. Effectively, this is the idea that nuclear weapons make the world a more dangerous place. Last, and potentially most important, there are those who support the idea that the American people could never stomach the use of nuclear weapons. It is a credibility argument. Why should the United States have nuclear weapons if it will not use them? With the arguments in support of nuclear disarmament established, a response to each will be offered.

The second section of this paper will provide counter arguments, in turn, to the "views of others" outlined in the first section. First, an analysis of history will examine what the effect of nuclear weapons has been. By reviewing the history of war in the twentieth century, an assessment of the utility of nuclear weapons will be made. Who has nuclear weapons? What has been the effect? Next, there will be a review of the cost of continuing to maintain a nuclear arsenal in relation to large-scale conventional conflict and other American spending. This comparison will shed light on the country's perceived priorities. Third, the idea that nuclear weapons make the world unstable and/or unsafe, leading to greater potential for conflict, will be reviewed. There will be a review of historical case studies, potential for future threats, and the insinuated effect of nuclear weapons. Last, the argument that the United States will never use nuclear weapons is important. This paper will examine the meaning of an existential threat and will open a broader discussion on the credibility of the nuclear arsenal. When have nuclear weapons been used? Is there any instance when they would be used again? Should they remain an option for the national command authority? Following this section in support of the political utility of nuclear weapons, this paper will move on to the last section dealing with policy recommendations.

This paper will conclude with a section discussing whether or not to maintain a nuclear arsenal, the ramifications of doing so, and policy changes needed to go forward. Policy recommendations will start with the idea that the United States must maintain a safe, secure, and effective nuclear deterrent in the future. This paper recommends that the United States modernize its nuclear arsenal and posits that dedicating national treasure to the nuclear arsenal is perhaps the most cost-effective deterrent to large-scale war and nuclear war. Furthermore, there will be a contention that the United States has control over instability in the world and that the

ability to assure allies and attribute nuclear weapons to their source are critical components to maintaining stability and burden sharing security around the world. Last, the recommendation will be made that the debate over the nuclear arsenal needs to be opened up to a greater audience by the DOD and the President. A deliberate effort to require a national discussion is required. The United States' nuclear posture and policy statements need to send a message to the world that clearly establishes credibility, is backed by the American people, and clearly communicates to the rest of the world.

Views of Others

Some believe that nuclear weapons exist for the sole purpose of deterring nuclear war. They believe nuclear weapons possess no political utility beyond that function, and as a logical follow on, that in a world without nuclear weapons, no one would require them for security. They argue that the existence of nuclear weapons is destabilizing the world over, makes international security more challenging, and makes small-scale military adventurism more likely. Robert Jervis described the situation as follows: "To the extent that the military balance is stable at the level of all-out nuclear war, it will become less stable at lower levels of violence."[1] The idea is that states will not be deterred from lower levels of war and will operate with relative impunity short of large-scale conflict. Some point to a nuclear India and Pakistan as an example of instability concern. In 1997, South Asia observer Neil Joeck argued:

> *India and Pakistan's nuclear capabilities have not created strategic stability (and) do not reduce or eliminate factors that contributed to past conflicts…. Far from creating stability, these basic nuclear capabilities have led to an incomplete sense of where security lies. Nuclear weapons may make decision-makers in New Delhi and Islamabad more cautious, but sources of conflict immune to the nuclear threat remain. Limited nuclear capabilities increase the potential costs of conflict, but do little to reduce the risk of it breaking out.*[2]

Effectively, the argument is that nuclear weapons do not stop war. This is correct. A historical review from the inception of the Atomic Age until the present is replete with examples of states, both nuclear and non-nuclear, engaging in conflict. Finally, there are those who believe the existence of nuclear weapons not only works at odds with stability, but that nuclear weapons make nuclear war more likely. George Perkovich of the Carnegie Endowment states, "If major powers of the twenty-first century are to avoid the destructiveness of the twentieth century, leaders will have to concentrate actively and assiduously on removing the temptation to initiate use of nuclear weapons."[3] The temptation Perkovich refers to is the existence of nuclear weapons.

In a time of economic austerity, some have voiced concern that nuclear weapons are a cost-prohibitive component of national defense. It is logical that military professionals, if left to their own devices and unfettered by budgets, want every advantage available. But with a current budget crisis and a spiraling national debt, is not the national treasure better spent elsewhere? Maintenance of the nuclear weapons complex costs approximately $25 billion per year, and it is estimated to cost $179 billion between 2010 and 2018 and then balloon to $500 billion over the next 20 years. [4] While these numbers are debatable, they are in the neighborhood of the general consensus. Clearly, nuclear weapons are not budget dust. Maintenance costs can be dubious and ambiguous when one considers that there is more involved in the cost of these weapons. Delivery systems, including high-ticket items like nuclear submarines, installation infrastructure, personnel costs, and other requirements, drive the price tag for the nuclear enterprise. Considering the fact that the United States has not launched a nuclear attack since 1945, it is not surprising some argue that the cost of nuclear weapons is prohibitive. The Nuclear Weapons Inheritance Project states, "The costs of nuclear weapons programs is enormous and for every dollar invested in advanced weapon systems a dollar less is invested in health, education, social welfare and development."[5] With a fixed budget, it is clear that funding nuclear weapons is a tradeoff with other spending. The group International Physicians for the Prevention of Nuclear War further points to more far-reaching financial tradeoffs and argues, "… the price of global elimination of starvation, provision of health care, provision of shelter and clean water, elimination of illiteracy, provision of sustainable energy, debt relief

for developing countries, clearance of landmines and more has been estimated to be about $260 billion annually for 10 years."[6] Clearly, the maintenance of the nuclear arsenal is a tradeoff. In fact, the nuclear arsenal costs more annually than the individual gross domestic product (GDP) of the world's bottom 90 nations.[7] Do Americans need a nuclear arsenal that costs billions of dollars per year and is projected to cost even more going forward, when we could redirect that money to healthcare, worldwide development, clean technology, and other priorities? Perhaps the taxpayers could do better.

In his 5 April 2009 Prague speech, the President of the United States said, "we must ensure that terrorists never acquire a nuclear weapon. This is the most immediate and extreme threat to global security." He further stated, "The existence of thousands of nuclear weapons is the most dangerous legacy of the Cold War."[8] The emergence of international, violent non-state actors has presented a challenge. Rogue states are also a concern. Iran is pursuing a nuclear weapons capability and has established relationships with terrorist groups like Hezbollah. The rationality of North Korea's leadership and its compulsion to avoid becoming a responsible member of the international community are problematic. In his book, *On Nuclear Terrorism*, Michael Levi asserts, "Theft is not the only way to acquire nuclear weapons or materials—states or their senior officials might deliberately transfer nuclear weapons or materials to terrorist groups." [9] Failed states or potentially-failed states could also be targets of opportunity for terrorists to acquire nuclear weapons. A nuclear-armed Pakistan, faced with internal instability, could lapse its nuclear security to the point that terrorists from the region could acquire weapons or material. These are considerable concerns that warrant examination. President Obama was not overreaching when he claimed, "One nuclear weapon exploded in one city – be it New York or Moscow, Islamabad or Mumbai, Tokyo or Tel Aviv, Paris or Prague – could kill hundreds of thousands of people." [10] Assuming a yield consistent with modern-day nuclear weapons, a nuclear detonation in a major city would be the most horrific act of instantaneous violence in the history of mankind.

Last, there is the argument that the United States will never again use nuclear weapons and, therefore, that nuclear weapons no longer provide a credible deterrent. In the 2010 *Nuclear Posture Review Report*,

the United States announced, "'negative security assurance' by declaring that the United States will not use or threaten to use nuclear weapons against non-nuclear weapons states that are party to the NPT and in compliance with their nuclear non-proliferation obligations."[11] The report went further in stating, "any state eligible for the assurance that uses chemical or biological weapons against the United States or its allies and partners would face the prospect of a devastating conventional military response – and that any individuals responsible for the attack, whether national leaders or military commanders, would be held fully accountable."[12] Finally, the report allowed the possibility that for "states that possess nuclear weapons and states not in compliance with their nuclear non-proliferation obligations – there remains a narrow range of contingencies in which U.S. nuclear weapons may still play a role in deterring a conventional or CBW [chemical or biological weapons] attack against the United States or its allies and partners."[13] While the preceding was a litany of "what if" statements, it indicates a prevailing reluctance to employ nuclear weapons. In fact, it strategically communicates a very narrow aperture in which the United States would consider using nuclear weapons. For an adversary, it is a roadmap to American redlines. Considering the range of military options available to worldwide state and non-state actors alike, this posture effectively confirms that short of nuclear attack, use of CBW, or large-scale conventional attack by a near peer, the United States' nuclear arsenal will stand down. Considering the low likelihood of such an attack, why maintain such an arsenal? The United States' own nuclear posture and policy nearly dictate that the country's leadership is moving further and further away from the nuclear option under any circumstances. The stated policy of the United States government implies that nuclear weapons may be a sunset capability. As such, the credibility of the nuclear deterrent has been overtaken by the pursuit of conventional superiority. The United States will not use nuclear weapons under nearly any circumstances, so why maintain the capability?

Counter Arguments

The passion on both sides of the nuclear weapons debate is considerable and should be addressed. The views of others outlined above, including statements made by the government of the United States, are

powerful and resonate in leadership circles around the world. There is an alternative view that demands attention in a dangerous world. Nuclear weapons have saved lives and will continue to save lives in the future. They will continue to exert political utility if managed, maintained, postured, and communicated correctly, and they are vital to the United States' national security.

Prior to discussing views in support of the nuclear arsenal, it is important to establish historical background salient to the issue. Who has nuclear weapons, when did they acquire them, and what do they have? Table 1 provides a short outline of worldwide nuclear powers.

Country	First Detonation	Warheads
United States	1945	1654 deployed*
USSR	1949	1480 deployed*
UK	1952	225
France	1960	300
China	1964	240
India	1998	Approx. 100
Pakistan	1998	Approx. 100
North Korea	2006	Approx. 5
Israel	1979?**	75-200

Table 1: Worldwide Nuclear Powers.[14]

* The United States and Russia maintain weapons in "deployed" status as well as reserves.

** Israel is known to have nuclear weapons but does not have a confirmed test. There is conjecture that Israel participated in a joint test with South Africa in 1979.

This background is important as these arguments move through the opposing viewpoints, as it can be instructive as to state behavior, stability, and security concerns. The first argument to address is that nuclear weapons only deter nuclear war. Many opponents of nuclear weapons misperceive the utility of nuclear weapons. Nuclear weapons do not exist to stop all war, just as a shotgun is not meant for killing spiders in one's home. Historically, nuclear weapons have accomplished two things: they deterred nuclear war and de-escalated or averted great-power war. This is historically supported by a review of twentieth-century deaths resulting from war. Prior to the culmination of World War II, the world went

through the first part of the twentieth century with tens of millions of war casualties as a result of great-power war. Following World War II, there has been a drastic decline in worldwide war deaths, and only one factor has changed: the advent of nuclear weapons. During World War I and World War II exclusively, war dead numbered over 25 million military members. Adding in civilians to the total for World War II brings the total count to nearly 70 million.[15] In the period following World War II to the present, war dead worldwide in all manner of conflict has been about 3.7 million.[16] This presents a significant contrast. There remain great powers with great militaries and opposing national interests. There remains evil in the world. The change has been that the cost of war has risen among the great powers to the point it is potentially unwinnable, due to the nuclear option. Evidence from the Korean War[17] and the Vietnam War[18] supports the premise that the potential for nuclear-power escalation played a role in the decision makers' calculus on both sides. In both cases, great-power war was averted, and, while major powers supported opposing sides of these conflicts, they avoided large-scale war with one another. Further, and more recently, the relationship between India and Pakistan has proven that nuclear weapons are de-escalatory. As is often the case in the nuclear debate, parties can view the same circumstances through an entirely different lens. J.N. Dixit, the National Security Advisor to Prime Minister Manmohan Singh, wrote, "A certain parity in nuclear weapons and missile capabilities will put in place structured and mutual deterrents. These could persuade the Governments of India and Pakistan to discuss bilateral disputes in a more rational manner."[19] Further, India's Army Chief, K. Sundarji, predicts, "the only salvation is for both countries to follow policies of cooperation and not confrontation…. A mutual minimum nuclear deterrent will act as a stabilizing factor." [20] Clearly, nuclear weapons possess utility beyond deterring nuclear war.

Having discussed the utility of nuclear weapons, are they cost prohibitive? The answer to this question is a matter of perspective. Considering the fact that $25 billion a year is roughly two percent of the United States' annual military defense spending, nuclear weapons are a bargain. However, considering potential tradeoff spending, this is a question of priorities and perspective. The American people supported World War II without an internal revolution to the tune of what would be trillions of modern-day dollars. It is arguable whether or not the Axis

powers presented an existential threat to the United States, but the threat to the country and its allies was considerable. Russian and Chinese nuclear weapons present an existential threat to the United States on a daily basis. Each country has enough weapons to destroy the American way of life within minutes. There is no arguing that $25 billion is a significant national expenditure, but it is far less expensive than great-power war or large-scale conventional war. The Iraq and Afghanistan wars have cost the country in excess of a trillion dollars, and counting, and these countries do not present an existential threat. The question for the American people is: are they comfortable abandoning nuclear weapons due to cost in the face of other countries with the capability of destroying the United States? It is worthwhile to bring American expenditures into this discussion. As discussed, the United States spends $25 billion dollars per year on maintaining the nuclear arsenal. Correspondingly, American citizens spend $40 billion on lawn care, $34 billion on gambling, $25 billion on professional sports, $17 billion on video games, $16 billion on Easter, and $10 billion on romance novels annually. [21] It is more a question of priorities, not cost. The United States can afford its nuclear weapons program, which serves to keep the country safe from malicious intent that is combined with capability.

Next, the potential for nuclear terrorism sponsored by rogue states or as a result of a nuclear security failure requires attention. While President Obama declared a nuclear weapon in the hands of terrorists the greatest threat facing America, this is not the case. It is not an existential threat. Chinese and Russian nuclear weapons, which present an existential threat, are the greatest threat to American security.[22] The United States has the ability to cooperate with other nuclear states, like Pakistan, to enhance their nuclear security. Security enhancements on the weapons themselves, as well as process improvements and communication protocols between nuclear adversaries, work to that end. Additionally, nuclear forensics leading to attribution is critical and attainable. Levi describes nuclear forensics as the "science and art linking nuclear materials to their sources."[23] The United States has the ability, and can communicate the ability, to attribute the origin of nuclear weapons or material to their source. By partnering with states on nuclear security, and by clearly communicating the ability to attribute the origin of nuclear materials, the United States can hold state actors at risk and deter proliferation to violent

non-state actors. It is important to reiterate that violent non-state actors are not deterred by America's nuclear arsenal, and should they obtain and detonate a device, it would be horrific. States are deterred by the nuclear arsenal, and states present existential threats; terrorists do not. The President's comment that the "existence of thousands of nuclear weapons is the most dangerous legacy of the Cold War" is also inaccurate. Thousands of secure nuclear weapons are safer than one unsecure weapon.[24] The legacy of the Cold War is that nuclear deterrence works. Further, a safe and secure arsenal, large enough to deter potential adversaries and assure allies, mitigates proliferation. As allied countries hear America's rhetoric about a desire to shrink the arsenal, as well as highly-limiting rhetoric about instances when nuclear weapons would be employed, they are more likely to pursue their own nuclear weapons. If more weapons are bad, too few weapons are worse. Security and attribution, combined with an arsenal capable of holding existential threats at risk, is the answer.

Is there any veracity to the contention that the United States will never use nuclear weapons? The issue of credibility must be addressed. Once capability is established, credibility becomes more of a discussion of intentions. The critical component to the credibility of the nuclear arsenal is not what the United States actually will do when challenged, but rather, what other states believe the United States will do. Credibility is a perception issue. Karl Heinz-Kamp and David S. Yost, in *NATO and 21st Century Deterrence*, describe credibility as "the interplay of capability and resolve."[25] The United States maintains nuclear credibility in the eyes of potential adversaries. The United States is the only nation that has used nuclear weapons in war. Adversaries remember that. Further, the idea that America has not used nuclear weapons since 1945 is incorrect. Nuclear weapons have been used every day since 1945 to provide a strategic deterrent. Evidence of this is that the United States has not had to kinetically engage an existential threat since the bomb fell on Nagasaki. In fact, following America's reaction to the attacks of September 11, 2001, the only plausible prevailing perception is that the United States is prepared to hold adversaries at great risk when presented with a threat to the homeland. If one expands this threat to the nuclear realm, there can be no doubt that the United States maintains credibility. Consider Israel, a nation surrounded by adversarial countries for its entire existence. Israel

has thwarted conventional attacks from neighboring countries but has never faced a battle for survival. If those countries did not believe Israel would resort to nuclear weapons in the face of a threat to national survival, Israel would already be gone. While Israel has never officially detonated a nuclear device, it maintains a credible deterrent due to the perception of nuclear capability. Deterrence is in the eye of the beholder, and American's nuclear arsenal remains credible and has history to back that up.

Policy Recommendations

Presently, the United States continues to maintain a nuclear arsenal. The future of that arsenal, and current debates surrounding it, demand a policy review. The U.S. President's principal policy statement must be an overt commitment to maintaining a nuclear arsenal large enough to hold every nuclear state completely at risk, as well as large enough to provide extended deterrence to allies. If counter-proliferation is a national interest, providing extended deterrence is critical. The current combination of rhetoric – including that coming from the United States government – pushing for disarmament and attempting to convince countries that they are safe under an extended deterrence umbrella is not sustainable. At some point, a reduced American arsenal will force partner states to abandon the extended deterrence umbrella and proceed with their own nuclear programs. The United States cannot have it both ways. Further, it is critical that in official United States communications, the United States exhibits a commitment to the nuclear deterrent for the future. This message will not be lost on potential adversaries. The message should be clear: the United States is posturing and resourcing itself based on the capability of other states and the potential threat, not the perceived intent. Intent can change. It would equate to military malpractice to recommend mitigation of the nuclear deterrent in the face of existential threats to the nation.

In addition to committing to maintenance of the nuclear arsenal, the United States should modernize its nuclear capability. The country cannot allow its sole deterrent against an existential threat to rust into retirement. Russia, China, and France have modernized weapons, and the United States has remained politically constrained from pursuing new

capability. To illustrate this point, two current debates are underway regarding a new bomber program and a redesign of the tail kit for the bombs that U.S. bombers can deliver. The B-52 fleet is nearly 60 years old, and the B-61 bomb it delivers is over 50 years old. Nuclear weapons remain the most cost-effective military capability the nation possesses. Not only would modernization and increased investment assure capability and enhance credibility, but it would send a message to potential adversaries that the United States will continue to hold them at risk should their intent turn malicious. Nuclear weapons are a self-defense capability. There is no historical example for when a weaker United States made the world a safer place. If the country is committed to maintaining the American way of life, it will demand commitment to nuclear weapons.

The United States has a decision to make between the safety derived from leadership or the hope of a more docile world. Absent leadership, proliferation may occur horizontally. Current non-nuclear states may pursue nuclear capability in response to U.S. conventional superiority or in response to decreases in the U.S. arsenal. The United States must be a leadership influence and ensure cooperation and discipline among nuclear nations. To a degree, proliferation among allies is within U.S. control. Maintaining an effective, safe, and secure arsenal assures allies. Ensuring states understand the existence of nuclear forensics and attribution will also dictate behavior. America cannot be a shrinking power, communicating weakness and leaning toward disarmament in the world, as it is now. Balancing power demands leadership, and the safest place from which to lead is from the position of power and influence. It is critical that the rhetoric and strategic communication coming out of U.S. leaders remains ambiguous enough to continue to communicate the threat that while the country intends to lead the world toward peace, it can still hold bad actors entirely at risk.

There is no doubt the nuclear debate will continue. However, the debate requires expansion. This discussion is too important to be left among think tanks and policy professionals, as it potentially affects the lives of all Americans. The United States has public debate regarding health care, steroid use in baseball, and *American Idol*, but not about nuclear weapons. While it is not rational to pursue disarmament in the face of a world with nuclear weapons capability, this has to be a discussion opened by the DOD and the President. During the Cold War, Americans

understood deterrence. There were infomercials regarding what to do during an attack, children practiced nuclear drills at school, and citizens and government buildings had shelters. This is not a recommendation to return to nuclear paranoia, but rather, to remind the American public why it is critical to maintain a nuclear arsenal for which they dedicate $25 billion a year. The threat and the solution must be supported by the American people, and they have been left out of the discussion. Americans have seen news stories regarding nuclear weapon buffoonery. They have seen wars in recent years that, while costly in terms of life and treasure, did not impact their daily ability to attend ballet practice and space camp. They need to be reacquainted with the sobering reality that there is a threat requiring their attention and a solution requiring their support.

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CHAPTER 12

Nuclear Issues: What Legislators and Policymakers Need to Know

Brian W. Adams

Nuclear weapons are not needed in modern civilized society. With the exception of the U.S. bombing Japan during World War II, no country has used them again, and none ever will. More pragmatically, the United States cannot afford nuclear weapons in light of budget cuts and the national deficit. As nuclear weapons are going away, other countries are not proliferating, and there is no real value or utility in having them. The United States can deter all enemies with overwhelming and effective conventional power, and again, since the United States has never used nuclear weapons since World War II, this is the self-evident reason that it does not need them today. These are the arguments that abolitionists use to justify the need for the United States moving toward a nuclear-free world.

The current administration seeks to downsize the U.S. nuclear arsenal, leading the way for all other nations to follow. Abolitionists concur, arguing that there is no existential threat to the United States, that the Soviet Union has collapsed, and that no other competitor, including China, is capable of creating and using a weapon that could reach the U.S. homeland. Also, keeping nuclear weapons promotes other states to develop or procure nuclear weapons in order to achieve parity, importance, and leverage with the United States. This leaves disarmament of the nuclear arsenal the only option forward.

The actuality is that the United States *does need* its nuclear arsenal, and this capability is a critical component of its national security strategy. Despite the taboo surrounding these weapons, the potential threat to human existence is real. No other weapon creates such a massive level of fear and the promise of absolute destruction in the blink of an eye. It is understandable that abolitionists desire that this menace be eliminated. If

all threats to the existence of the United States ended today, it would not need nuclear weapons. But until universal peace is achieved, the United States must preserve its national security using its nuclear arsenal as a cornerstone.

Realistically, the United States must continue to possess nuclear weapons. In the strategic environment of complex and varied actors, U.S. lawmakers and policy makers should know about nuclear weapons to understand their significance and worth in the twenty-first century. Legislators within Congress, policy makers within the administration, and members of the nuclear enterprise should fully understand the relevance, value, and need for the nuclear enterprise before shaping, creating, and implementing policy decisions affecting U.S. national security.

Advocating Disarmament

The United States is founded on the principles of liberty and opportunity, with a leadership ideal that is more powerful than any weapon. After World War II and throughout the Cold War, the United States adhered to an ideology that is becoming a model for the rest of the globe to follow. When the United States emerged as the only remaining superpower, avoiding the horror of nuclear war, it became apparent that America must lead the world by example into an era free of catastrophic annihilation. Advocates for global nuclear disarmament believe that eliminating the U.S. nuclear arsenal is the way to encourage other countries to follow, while ensuring security with a small and responsive nuclear force. Their reality is that nuclear weapons are Cold War relics, and with the United States' current conventional capability overmatch, coupled with the problem of a growing national debt, the United States cannot afford a massive triad-based arsenal that burdens the military and does not promote a smart use of strategic nuclear forces.

This idea of modern utility was stated by President Obama during his 2009 speech in Prague: "The existence of thousands of nuclear weapons is the most dangerous legacy of the Cold War. No nuclear war was fought between the United States and the Soviet Union, but generations lived with the knowledge that their world could be erased in a single flash of light."[1] As Soviet Union was effectively dismantled after 1989 with the tearing down of the Berlin Wall, the national strategic

policy of containment ended. After the combat of Operation Desert Storm in 1991, the United States emerged as the only superpower, ushering in an era of unipolar dominance. Nuclear weapons that were the cornerstone of the containment policy became less important. The specter of nuclear annihilation using mutually-assured destruction dematerialized with the downfall of the Soviet Union and the demonstration of U.S. conventional military capability during the first Gulf War.

The United States is the only nation to use nuclear weapons in war. Harnessing and wielding the power of the atom is both historic and horrific. The two bombs dropped on Hiroshima and Nagasaki instantly killed over 100,000 human beings and effectively ended World War II.[2] Nuclear weapons have never been used again against another nation state, as the civilized world acknowledges the absolute repulsion in use. These weapons only served their purpose during a time of total war. Abolitionists advocate that the U.S. nuclear arsenal is simply not used for military purposes.[3] Nuclear arms are obsolete remnants of the Cold War and are a wasted investment in an era of enlightenment and fiscal constraint.

In today's strategic environment, no country on earth challenges the United States with their military element of national power. The United States' advanced conventional capability is unmatched and is the most powerful force in history. Even though other nations possess nuclear weapons, abolitionists believe that the archaic idea of nuclear deterrence does not rest with a nuclear retaliatory capability.[4] With the advent of new technology, deterrence can be achieved through conventional means using precision strike assets to defend and attack nuclear delivery mechanisms with superb accuracy, while simultaneously protecting against loss of civilian life. Also, through the eventual elimination of the U.S. nuclear enterprise, the United States can exercise fiscal responsibility during a time of an unprecedented national debt.

As the world's most powerful nation, the United States is also the richest. The U.S. GDP is $15.68 trillion, with 4.4 percent invested in defense.[5] The next closest nation is China, with a GDP of $8.22 trillion and 2.0 percent spent for defense.[6] Even though the United States has twice China's GDP and effectively four times the investment in defense, U.S. dominance may not last forever. With millions of dollars spent annually, this money could be better used to balance the budget and attack the national debt, which the former Chairman of the Joint Chiefs of Staff,

Admiral (Retired) Michael G. Mullen believes to be "the single, biggest threat to our national security."[7] The nuclear enterprise budget remains a significant drain on resources that could be better spent. Nuclear abolitionist organizations such as the Global Zero U.S. Nuclear Policy Commission, known by its short title as "Global Zero," describe how this is possible.

Global Zero advocates that nuclear weapons need to be significantly reduced, and it outlines a path to follow. Achieving this goal has been argued as a matter of established policy and continually reinforced by the U.S. President as part of national defense strategy. Global Zero asserts that, over the next decade, the United States will spend $1 trillion for maintaining its nuclear arsenal.[8]

Global Zero acknowledges that completely eliminating the U.S. nuclear arsenal while other nations possess nuclear capabilities would create an unacceptable risk to U.S. national security. The President directed that the United States will maintain a safe, secure, and effective arsenal to deter any adversary, and the United States guarantees that defense to its allies.[9] Having a smart-sized capability of nuclear weapons leveraging a dyad concept of submarines and strategic bombers will save money in the budget and streamline policies and procedures for nuclear deterrence, creating cost savings by eliminating expensive missile fields and outdated bomber fleets.

In the final analysis, Global Zero offers a notional force structure that consists of ten Trident ballistic missile submarines armed with 720 strategic missile warheads and 18 B-2 bombers armed with 180 gravity bombs. [10] This configuration maximizes flexibility and meets the requirements for nuclear deterrence and a second-strike capability. It also promotes fiscal responsibility by streamlining the number of delivery platforms to two types.

The gap in prosperity between the United States and the rest of the world is shrinking, with China increasing its GDP an alarming rate. America cannot afford superfluous spending and wasting money on weapons that it does not use. With declining budgets designed to curb massive government spending, nuclear abolitionists advocate that a solution is found by cutting the nuclear enterprise. Since the United States possesses the most decisive and effective advanced conventional capability, unmatched by any other nation on the face of the earth, coupled

with missile defense and emerging precision global strike, the United States could effectively deter any nuclear threat across the globe.

While an advanced conventional capability is needed as a complementary part of deterrence, the nuclear arsenal has utility and is essential for national security. The real issue is education. According to senior government officials, many U.S. legislators, policy makers, and senior military leaders have lost the comprehensive understanding about the nuclear enterprise that once existed, and efforts must be made to regain this knowledge. This paper is written to reinforce that these weapons are a stated requirement, have a cost-effective value, and are a relevant need.

Using Nuclear Weapons Every Day

Those promoting the need for a nuclear arsenal understand that the United States uses nuclear weapons every day. The U.S. nuclear arsenal is extremely important in the twenty-first century. As nuclear arms are fast-growing weapons of choice for rival nations to achieve military parity, the thought of the U.S. arsenal being a Cold War relic is mistaken. There has never been a more complex strategic environment as there is today, with multiple nations possessing advanced technology, including weapons of mass destruction. As long as nuclear weapons exist, the U.S. arsenal remains relevant. Nuclear weapons are required by Presidential policy, have inherent value in statecraft, and are used daily in deterring potential adversaries from threatening U.S. national security and in assuring protection for U.S. allies and partners.

The requirement for the U.S. nuclear arsenal is clearly outlined in the NSS. In the modern age, nuclear dangers have proliferated, and the United States must prevent the spread of nuclear weapons. The NSS states, "The gravest danger to the American people and global security continues to come from weapons of mass destruction, particularly nuclear weapons."[11] As a matter of policy, the U.S. military must maintain a nuclear deterrent capability. Since more nuclear capable states exist today than did during the Cold War, the United States must achieve overmatch to ensure its national security. Policymakers and legislators cannot allow another nation to hold the United States hostage or at risk with nuclear capability.

The United States employs diplomatic, informational, military, and economic elements of national power to influence the actions of other nations. From the military aspect, it uses its nuclear arsenal to deter countries every day as a critical component of national security strategy. Also, there is a wider range of options available for decision makers, providing other methods of leveraging nuclear capability. The methods of dissuasion, compellence, and assurance are used in conjunction with deterrence to achieve the desired behavior that is in the best interests of U.S. national security. Deterrence is similar to dissuasion and compellence (because these approaches target adversaries using varying degrees of severity and consequences) but different from assurance, where the focus shifts to allies and partners on amenable terms of diplomacy.

Nuclear weapons have inherent value in statecraft by keeping a threshold on the level of violence that could erupt between nations. This becomes especially important when disagreements between nuclear powers change from diplomacy and escalate into military action. This model was proven time and again during the Cold War, where nuclear weapons became a stabilizing factor preventing major wars from occurring.[12]

With China's power on the rise and with China having the second largest GDP in the world, China's defense modernization will continue moving forward along with its nuclear program. Smaller nations like Iran and North Korea already have the potential to hold their regions hostage with the threat and actual proliferation of nuclear weapons, and the United States must counter this capability. Additionally, the U.S. nuclear arsenal provides openings for diplomacy and enables peaceful negotiations with nuclear states by offering de-escalation of tensions.

The United States maintains a relevant nuclear arsenal, deterring potential adversaries from threatening its national security and assuring protection to U.S. allies and partners by convincing them not to proliferate nuclear weapons. The United States cannot allow other competing nations to influence its behavior in a manner that threatens its national security interests. Even with the most modern and lethal military in the world, the United States faces clear and present danger from countries developing ballistic missiles that will eventually threaten the U.S. homeland. The U.S. nuclear arsenal is becoming even more relevant to deter adversaries.

With respect to nonproliferation, the United States uses its nuclear arsenal every day to assure allies and partners that they do not need to build or buy nuclear weapons to defend their homelands. Again, as a key objective outlined in the NSS, the United States will protect and defend its allies and prevent proliferation. In the Middle East, counties such as Saudi Arabia, Jordan, and Egypt may acquire a nuclear capability if America fails to contain Iran's ambition to possess nuclear weapons. In Northeast Asia, the nations of Japan, South Korea, and Taiwan may build nuclear weapons the instant that the United States is deemed no longer credible in providing extended deterrence.[13] The strategic environment then becomes even more complex as each of these nations challenges the existence of the other.

For nuclear assurance, this action is focused toward partner nations. The United States must assure allies that it will afford a credible defense against a hostile nuclear state. Extended deterrence is critical for defending allies, partners, and friends and preventing these nations from proliferating nuclear weapons for their own national security. Credibility and resolve are critical components of assurance that extend beyond the nuclear capability. This change in focus of the audience is a significant shift between deterrence and assurance.

The relevance of the U.S. nuclear arsenal is that it is a stabilizing force for peace across the globe. Again, as long as other nations possess or have the potential to create nuclear weapons, the United States must maintain a strong capability. The U.S. nuclear arsenal is used daily to deter competing nations and assure allies. These weapons are used every day, reducing risk for the United States and providing a mechanism for influencing other nations, while protecting national security interests. In order to maintain this advantage, funding the nuclear arsenal is critical. With the shrinking defense budget, this requirement is at risk.

Cost-Effective Value

U.S. power is a direct result of realist economic and military might coupled with the operational blueprint of liberal democracy. This strength is unmatched by any other nation, and the United States should maintain this unipolar position to preserve the American way of life. Nuclear weapons have intrinsic value that exceeds the modest monetary

expenditure and ensures that other competing nations do not achieve supremacy over the United States with their nuclear ambitions. After more than a decade of conventional war, policymakers have lost focus on the importance of maintaining the nuclear arsenal, putting the United States' strategic position at risk. The cost-effective nuclear arsenal, which is essential for preventing proliferation by other nations and maintaining U.S. primacy, has been neglected since the end of the Cold War, in part due to a procurement holiday.

It is difficult to determine the exact operational and maintenance cost of the entire nuclear enterprise. Several agencies, including Congress, calculate the budgetary expenditure differently depending on the reporting context. Nuclear platforms, such as dual-use strategic bombers and nuclear submarines, have operating and maintenance costs for the equipment embedded in the budget of the Air Force and Navy within DOD. Additionally, DOE receives a budget for the NNSA, which is responsible for providing oversight for all national labs. To further complicate the calculation, each lab engages in different scientific programs – including energy alternatives – that do not relate directly to the nuclear weapon enterprise.

At the Aspen Security Forum in July 2013, then-Deputy Secretary of Defense Ashton B. Carter stated:

> *You may all be surprised to know that nuclear weapons don't actually cost that much. Our annual spending for nuclear delivery systems is about $12 billion a year. This is out of around $525 billion, our budget, coming down. And another $4 billion for the command and control system that goes with the nuclear weapons… the special communications to make sure that the president could retaliate under any circumstances, especially if we're attacked first, and all that, another $4 billion. So that takes you up to about $16 billion.*[14]

By comparison, the U.S. Postal Service reported a record $15.9 billion net loss in November 2012. [15] For cost effectiveness, the U.S. nuclear arsenal is more valuable in ensuring national security than is the mismanagement of a government agency charged with delivering the mail.

There is a clear "bang for the buck" that nuclear weapons provide that is directly related to the primacy of the United States. It is critical that U.S. forces are strong enough to dissuade adversaries from pursuing nuclear proliferation with the intent of equaling or usurping U.S. strategic power. According to Dr. Keir A. Lieber of Georgetown University, "It is in our national interest to openly seek primacy in every dimension of modern military technology, both in its conventional arsenal and in its nuclear forces."[16] Essential to this strategy is keeping other nations from proliferating nuclear weapons.

It is less expensive for a nation to create or purchase a nuclear weapon than it is to establish and maintain a standing army, navy, or air force. Again, with the massive economic power of the United States, no nation on earth could spend enough to achieve parity or overmatch of its conventional power. This makes nuclear technology very attractive, because it offers prestige to any county on the international stage by achieving a level of parity with the United States. If smaller nations acquire nuclear weapons, the balance of power will shift, creating risk in the United States' influence over international events. As nuclear weapons proliferate, the United States will find itself in future conventional conflicts with nuclear-armed adversaries.

Preventing other nations from creating nuclear weapons is part of the U.S. strategy outlined in the 2010 *Nuclear Posture Review Report*. To accomplish this, all elements of national power, including diplomatic, economic, and military, can be employed. Today, the United States is very focused on this issue of nonproliferation for both Iran and North Korea. When applied effectively, the U.S. nonproliferation strategy has been successful in the past, preventing nations such as South Africa and Libya from creating nuclear weapons.

Even though the importance of nuclear weapons is clearly defined in the NSS, the U.S. nuclear enterprise has been neglected over the past 20 years due to a procurement holiday as a direct result of an absent national strategy.[17] As the United States has primacy in the world as the only superpower, defining a foreign policy strategy became less important to the administrations that followed the Cold War. Once the Soviet Union was defeated, the grand strategy of containment was no longer used, causing neglect of the U.S. nuclear enterprise.

With this devaluation, legislators and policy makers lost focus for the past 20 years, and countries such as Pakistan, North Korea, and Iran made strides in each of their nuclear programs. International treaties that ban nuclear testing and require disarmament have been the focus of the past three administrations, further hampering the modernization of the U.S. nuclear enterprise. Policy becomes muddled in rhetoric when the cornerstone for foreign policy is required to be safe, secure, and reliable, without emphasis given to ensure this guidance is met. The United States' nuclear weapons are aging. Policy makers must rediscover the value of the U.S. nuclear arsenal and the linkages between a successful grand strategy and international policy. An atomic renaissance must happen, beginning with modernization of the U.S. nuclear arsenal.

The Essential Nuclear Arsenal

Modernization of the nuclear arsenal is imperative for an effective U.S. national security strategy. Refurbishing, reusing, and replacing nuclear weapons is the requirement, and policymakers must recognize the importance of these endeavors and ensure that the appropriate funding is allocated to accomplish this essential task. When replacing weapons, incorporating the ability to tailor the warheads to smaller yields is a must, enabling more credible options during a crisis. Also, funding for delivery platforms in the Air Force and Navy budgets is required, along with the investments in advanced conventional capabilities, missile defense, and the strategically-sound platforms for the triad of bombers, submarines, and missiles. In order to ensure a safe, reliable, and effective nuclear arsenal, the United States must modernize the force that is founded in a triad and complemented by an advanced conventional capability.

The nuclear arsenal of the United States is old. The newest weapon in use was designed in the 1980s, using technology of that day. With the ban on nuclear testing, these weapons have not been exploded in a controlled environment to ensure their reliability since 1993. Even with the high confidence of component testing that the National Labs conduct, this still falls short of the reliance and credibility achieved through actual testing. With further reductions through arms control, the United States needs to modernize its nuclear weapons, creating an effective arsenal that counters the wide array of modern adversarial nation threats.

Smaller nations that acquire nuclear weapons are not deterred by a 350-kiloton yield nuclear weapon. Countries understand the no-first-use-policy of the United States and the fact that the United States has never used a bomb in anger since World War II. Unless these smaller nations directly threaten the homeland, U.S. credibility on first use is unsteady. The lack of lower-yield weapons diminishes the utility of compellence as a graduated option against an adversary, creating an all-or-nothing scenario and resulting in unenviable use for the President. Producing modern nuclear weapons with graduated yields will solve this problem.

In addition to the nuclear weapons, the employment platforms have been aging, without designs for replacement. With airframes, the current plan is to modify and life-extend the B-2 and B-52 bombers, keeping these systems deployable over the next three decades well into 2040.[18] The Air Force celebrated the 50th anniversary of the B-52 in 2012.[19] It has been in use for five decades and is becoming the oldest airframe in the U.S. inventory, aging over 80 years total at the end of the current plan. The Minuteman III has been in service since 1970 and will be life-extended until 2050.[20] For a nation with the most advanced military capability, the platforms for nuclear weapons have clearly been neglected since the end of the Cold War.

Bombers, ICBMs, and submarines give credibility to the U.S. nuclear capability and deter adversarial nations from launching strikes against the U.S. homeland, allies, or vital interests. Nuclear submarines create the desired psychological effect upon adversaries through the fear of the unseen retaliation force. This stealthy method is balanced by visible nuclear-armed bombers which are crucial for signaling intent to the enemy and provide a way to escalate and de-escalate tension during a crisis. They can also be recalled if necessary. ICBMs offer a last line of defense, creating a targeting problem for most enemies and an unmatched prompt response. They are predictable, reliable, and always on alert. Dr. Adam Lowther from the Air Force Research Institute best summarizes the value of ICBMs, stating, “these missiles are the only leg of the triad that can hit any spot on the earth within half an hour.”[21] This required capability mix of nuclear delivery systems enables the United States to deter other nations by signaling intent, de-escalating hostility, and ensuring survivability for use.

As the nuclear triad offers distinct value from the flexibility of bombers, the survivability of submarines, and the responsiveness of ICBMs, the emerging advanced conventional capability further complements the nuclear arsenal and enhances U.S. credibility of deterrence. Anti-ballistic missile technology has materialized with tangible systems resulting from the investments made over the past 15 years, providing real protection of the U.S. homeland along with a viable theater ability to shield U.S. allies and partners. Unencumbered by the current restrictions for creating new nuclear weapons, this capability will continue to improve. Also, the investments made in prompt global strike will give the President the option of precision, holding any adversary around the world at risk with a one-hour response time.

It is important to remember that even though new advanced conventional weapons may address mission sets assigned to nuclear weapons, they cannot replace the value of the nuclear arsenal. As a complementary asset to the triad, ballistic missile defense and prompt global strike cannot deter a nuclear adversary alone. Nuclear weapons are different and create a psychological factor for the enemy that no other weapon can. All of these assets used in concert give the President multiple options to secure U.S. national interests and positively affect foreign policy.

Conclusion

Legislators and policy makers must understand that nuclear weapons are needed in the modern civilized society and have been used every day since their creation. As the richest nation on earth, the United States must maintain its primacy by maintaining and improving its nuclear arsenal and investing in modern delivery platforms. It is understood that the past decade of war has drained the budget and increased the national debt. But the United States cannot afford to overcompensate by further neglecting the nuclear cornerstone of American foreign policy. Competing nations are proliferating nuclear weapons and firmly believe in their value, and the United States cannot deter every country with overwhelming and effective conventional power. This has been proven in both Iraq and Afghanistan. The United States needs nuclear weapons today as it did during World War II. Nuclear abolitionists have the argument wrong.

Nuclear peer competitors such as Russia and China still exist, possessing advanced nuclear capabilities coupled with modern delivery vehicles. These countries pose an existential threat to the United States, and emerging nations are already advancing their long-range missile technology that will be able to reach the U.S. homeland within the next decade. Modernizing the nuclear arsenal along with the advanced conventional capability is the path to success and maintaining the balance of power in favor of the United States.

America needs its nuclear arsenal, and it is the cornerstone of its national security strategy. Nuclear abolitionists advocate total disarmament and dismiss the realist requirement for national security. Legislators in Congress, policy makers in the administration, and nuclear stakeholders should fully understand the relevance, value, and need for the nuclear enterprise before shaping, creating, and implementing policy decisions affecting U.S. national security.

Recommendation

The nuclear arsenal of the United States is extremely relevant in the twenty-first century. As nuclear arms are fast becoming weapons of choice for rival nations as an inexpensive way to achieve military parity, the thought of the U.S. arsenal being a Cold War relic is mistaken. Nuclear weapons are required by Presidential policy, have inherent value in statecraft, and are used daily in deterring potential adversaries from threatening U.S. national security and assuring protection for U.S. allies and partners.

The influence that the United States has is a direct result of its realist economic and military power, and this strength is unmatched by any other nation. The threat to national security is that the cost-effective nuclear arsenal which is essential for preventing proliferation by other nations and maintaining U.S. primacy has been neglected since the end of the Cold War due to a procurement holiday. The United States uses its nuclear arsenal every day for the national security of the United States. In order to ensure a safe, reliable, and effective nuclear arsenal, the United States must modernize the force that is founded in a triad and complemented by an advanced conventional capability. This military power is the cornerstone for American foreign policy.

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Contributors

Colonel Brian W. Adams (USA) is a 1992 Distinguished Military Graduate from the University of South Florida with a Bachelor's Degree in Accounting. He possesses a Master's Degree in Business from Columbia Southern University, Alabama. Since his commission in the U.S. Army Air Defense Artillery, he served in multiple positions from Battery to Battalion Command in all capacities of air and missile defense. His most recent assignment was as the Director, Strategic Communications for the Fires Center of Excellence, Fort Sill, Oklahoma.

Lieutenant Colonel Steve Carroll (USA) has a Master's in Business Administration and a Bachelor of Science in Environmental Engineering and Business Computer Systems. He is a graduate of Command and General Staff College. His last assignment was at U.S. Northern Command as a liaison to the Federal Emergency Management Agency. LTC Carroll is an Alaska Army National Guard Soldier assigned to the National Guard Bureau in Arlington, Virginia.

Lieutenant Colonel Anita A. Feugate Opperman (USAF) was commissioned in 1994 as a graduate of the Reserve Officers Training Corps program at Indiana University in Bloomington, Indiana. After completing training at Vandenberg AFB, California, she was assigned to the 319th Missile Squadron at F.E. Warren AFB. She served as a Missile Initial Qualification Training instructor and evaluator at Vandenberg AFB, followed by Assistant Operations Officer with the National Polar-orbiting Operational Environmental Satellite System Integrated Program Office in Silver Spring, Maryland. Later, she developed Space and Missile operations career field policy at both the MAJCOM and Air Staff-level. She was the executive officer to the Assistant Vice Chief of Staff and then served as Chief, Congressional Relations, both at the Pentagon. In addition, she was 90th Missile Wing Chief of Safety and prior to this assignment, she served as the Commander, 320th Missile Squadron both at F.E. Warren AFB, Wyoming.

Lieutenant Colonel Bob Hoskins (USAF) is a career personnel officer. He has experience in promotions at HQ Air Force Personnel Center and at all levels of flight and squadron personnel duties, including command. Lt Col Hoskins worked in rated management at HQ Air Combat Command, and was the Wing Executive Officer in the 100th Air Refueling Wing at RAF Mildenhall, United Kingdom. He was the Military Personnel Flight Commander at Wright-Patterson AFB, Ohio, and commanded the 82d Mission Support and 82d Force Support Squadron, Sheppard AFB, from 2007-2010. Lt Col Hoskins completed his joint tour requirements as the Chief, Senior Leader Management at HQ United States Strategic Command. He is a graduate of Indiana University and the Air Command and Staff College.

Lieutenant Colonel Shelley B. Kavlick (USAF) is an Aircraft Maintenance Officer with Financial Analysis and Planning and Programming experience. Lt Col Kavlick graduated from the University of California at Davis in 1994 and was commissioned a Distinguished Graduate from the Air Force Reserve Officer Training Corps. Additionally, she completed graduate studies in the United Kingdom at the Royal Military College of Science, Cranfield University in 2003 and at the Air Command and Staff College in 2007. In her previous assignment, Lt Col Kavlick served as the Assistant Executive Officer to the Chief of Air Force Reserve, Headquarters, United States Air Force, Pentagon, Washington, D.C. She is a veteran of Operation ALLIED FORCE and has served as the senior USAF Maintenance Officer for the 425th Fighter Squadron (PEACE CARVIN II) Foreign Military Sales program between the United States and Royal Singaporean Air Forces.

Lieutenant Colonel Thomas Kirkham (USAF) is a munitions maintenance officer with twenty years of experience in both nuclear and conventional munitions as well as aircraft maintenance on heavy bombers. In his previous assignment, he was the Deputy Commander, 2d Maintenance Group, Barksdale AFB, Louisiana, where he was responsible for maintaining 27 B-52H aircraft. Additionally, he served in U.S. Central Command as Chief, Joint Munitions Office where he was responsible for munitions re-supply and planning efforts for all services deployed to the Arabian Peninsula and Central Asian States. He has also commanded a

nuclear munitions squadron at Whiteman AFB, Missouri and served as a weapons safety officer at the Munitions Support Squadron located in The Netherlands.

Lieutenant Colonel Karyn E. McKinney (USAF) graduated from Thiel College in 1990 with a Bachelor of Arts degree in Biology and from the University of Pittsburgh School of Dental Medicine with a DMD degree in 1998. She also received a Master's Degree in Public Administration from the Troy State Distance Learning Program in 2004, and she received a certificate of training for the Advanced Education in General Dentistry two-year residency from Wilford Hall Medical Center in 2006.

Colonel Eric Y. Moore (USAF) is the former Deputy Commander, 90th Maintenance Group, 90th Missile Wing, F.E. Warren AFB, Wyoming. The unit directs maintenance on 150 Minuteman III Intercontinental Ballistic Missiles and 15 Missile Alert Facilities throughout Wyoming, Nebraska, and Colorado in direct support of United States Strategic Command and the National Command Authority. Col Moore was commissioned from the Air Force Academy in 1992. He has held a variety of positions in the acquisition and maintenance career fields.

Lieutenant Colonel Donald M. Neff (USAF) is the commander of the 173rd Air Refueling Squadron, 155th Air Refueling Wing, Nebraska Air National Guard. He serves as a traditional guardsman and is a KC-135R command instructor/evaluator pilot with over 6500 flight hours in multiple Air Force and civilian airframes. As a civilian, he works for United Airlines as a First Officer on the Boeing 757/767. He enlisted in the NEANG in 1989 and served as an RF-4C Photo Sensor Maintenance technician. After earning a B.S. in Accounting from the University of Nebraska, he completed Undergraduate Pilot Training and KC-135R aircraft qualification in 1995. In 1998, he transferred to the USAF Reserves flying the C-5A/B at Dover AFB, Delaware. Returning to NEANG in 2001, Lt Col Neff has served as a Combat Crew Tactics Instructor, Aircraft Maintenance Quality Assurance Officer, Flight Commander, Director of Operations and Squadron Commander. He holds an M.B.A. from North Carolina State University in Supply Chain Operations and Finance and has completed staff tours with AMC's Fuel

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Colonel Paul Schumacher (USA) is a Reserve Officer Training Corps, Distinguished Military Graduate from Mercer University, Macon, Georgia. He was commissioned as a Regular Army, 2nd Lieutenant in the Field Artillery in 1991. He served in a variety of command and staff positions from Battery to Brigade level in both towed and rocket artillery. He transitioned to Functional Area 52, Nuclear Operations and Counterproliferation, in 2004 serving as a Nuclear Policy Officer in U.S. European Command and Assistant Professor of Chemistry, United States Military Academy. Col Schumacher holds a Bachelor's degree in Chemistry from Mercer University, a Master's degree in Analytical Chemistry and Doctorate degree in Radiochemistry from Washington State University.

Ms. Michelle Stinson is an Intelligence Officer with the Office of the Director of National Intelligence (ODNI). She graduated from Auburn University with a Bachelor of Arts degree in International Business and from the Johns Hopkins School of International Studies with a Masters of Arts degree in International Economics and European Area Studies. She joined ODNI after retiring from the US Army where she served as an Intelligence and Foreign Area Officer. Since retirement from the Army, Ms. Stinson has served as a National Intelligence Collection Officer, Sensitive Reconnaissance Operations Coordinator, Deputy Group Chief, Operations Center supervisor, and as a program manager and technology analyst.

Lieutenant Colonel Bobby C. Woods, Jr., (USAF) was previously the Deputy Commander of the 479th Flying Training Group at Naval Air Station Pensacola, Florida, where he trained Combat Systems Officers. Lt Col Woods received his commission from Reserve Officer Training Corps, Mississippi State University, Starkville, Mississippi, in 1992 after earning his Bachelor of Business Administration degree in Systems Management. He has served as a Special Operations Low Level II (SOLL

II) Radar, Evaluator, and Instructor Navigator in the C-141B as well as an Instructor Navigator in the T-43A and a Combat Systems Officer Instructor in the T-1A. His flying assignments include operational and training assignments at McGuire AFB, Randolph AFB, and NAS Pensacola. His staff assignments were at the 18AF/TACC in the Current Operations Directorate, Special Missions Division and Joint Staff J-3, National Military Command Center (NMCC) Operations Team Four, Pentagon. Lt Col Woods was a Nuclear Strike Advisor and Assistant Deputy Director for Operations while at NMCC. He was most recently deployed in support of Operation ENDURING FREEDOM-Philippines in the Joint Special Operations Task Force-Philippines, where he served as the Joint Special Operations Air Detachment, Deputy Commander.

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