A Nuclear Review for a New Age

The 2010 Nuclear Posture Review (NPR) explicitly elevated nonproliferation "for the first time" to the highest priority of US nuclear policy, among other priorities, including deterrence and assurance.[1] It also identified a reduction in the roles and number of nuclear weapons as a means to promote its priority nonproliferation goal. Senior Department of Defense (DOD) officials identified "preventing nuclear proliferation and nuclear terrorism" and "reducing the role of nuclear weapons in US strategy" as the top US strategic objectives, and stated explicitly that the DOD assessed "deterrence requirements against these metrics."[2] Proponents of using further US nuclear reductions and limitations to promote nonproliferation argue that US nuclear-force reductions contribute to decisions of other countries to forego nuclear weapons or to more seriously pursue nonproliferation. There is, however, little to no evidence supporting this widely claimed linkage. Instead, considerable evidence exists indicating that credible US nuclear capabilities contribute to the assurance of allies and thus to the goal of nonproliferation.

Today there is a consensus in Washington regarding the deteriorating security environment since 2010, and senior DOD officials accordingly have identified US nuclear deterrence as the department's "highest priority mission."[3] US nuclear weapons and delivery systems have aged while potential adversaries have increased and modernized their arsenals. The attitudes and perceived options of US allies in many cases are different as well. Taken together, these and other changes highlight the high priority of the new NPR and the need for well-informed discussions leading to new guidance.

The 2017 NPR should explicitly reestablish deterrence, assurance, and damage limitation as the priority goals for US nuclear policy. Nonproliferation remains important, but the emphasis on it as the priority

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This article is drawn from Keith B. Payne and John S. Foster Jr., *A New Nuclear Review for a New Age* (Fairfax, VA: National Institute Press, 2017). In addition to the authors of this article, participants in this study include Dr. Kathleen Bailey; Gen Kevin Chilton, USAF, retired; Mr. Elbridge Colby; Mr. Matthew Costlow; Dr. J. D. Crouch II; Ms. Michaela Dodge; Amb. Eric Edelman; Mr. Fritz Ermarth; Dr. Colin S. Gray; Mr. Kurt Guthe; Dr. John Harvey; Ms. Rebeccah Heinrichs; Amb. Robert Joseph; Dr. Thomas Karako; Gen C. Robert Kehler, USAF, retired; Dr. Susan Koch; Dr. Matthew Kroenig; Sen. Jon Kyl; Dr. Steven Lambakis; ADM Richard Mies, USN, retired; Hon. Franklin C. Miller; Sen. Charles Robb; Dr. Bradley Roberts; Mr. Guy Roberts; Mr. Thomas Scheber; Dr. Mark Schneider; Dr. William Schneider; and Gen Larry Welch, USAF, retired.

goal "atop" US nuclear policy, and the corresponding prioritization accorded to the continuing reduction of US nuclear forces, should not be sustained. The realities of the contemporary threat environment and the corresponding prioritization of credible deterrence, assurance, and damage limitation are key factors to consider in the new NPR mandated by the Trump administration.[4] This alone is no small difference from the dominant post–Cold War nuclear policy narrative, which has sought largely to limit and reduce US nuclear capabilities on a continuing and progressive basis. This article briefly examines the nuclear challenges facing US deterrence strategy. It then analyzes US nuclear policy and purpose including adaptability, declaratory policy, modernization, missile defense, arms control, capacity, and affordability while offering recommendations. Regional security issues in NATO and Asia also are discussed along with implications and recommendations.

Nuclear Challenges

The world looks very different—and much more threatening—today than it did at the time of the last NPR in 2010. Therefore, a new review of US nuclear policy and requirements must begin with a realistic assessment of the security environment and the challenges it poses. The four countries whose leadership and doctrine continue to be of greatest importance to US nuclear policy are the Russian Federation, the People's Republic of China (PRC), the Democratic People's Republic of Korea (DPRK), and the Islamic Republic of Iran. In addition, the potential terrorist-style actions of belligerent non-state actors continue to be of major concern. Each is considered in turn.

Russia

Russian leaders now appear to consider their country's nuclear capability as an enabler of expansionist regional actions. Developments in Russian doctrine elevate the potential role of nuclear weapons. Most ominously, public reports indicate that Russia has developed an "escalate-to-win" approach that includes threats of nuclear first use and apparent planning for nuclear first use in regional conflicts to demonstrate the extreme risks of Western resistance to Russian geopolitical gains.

Russia has put highest priority on modernizing strategic and nonstrategic nuclear capabilities for the past decade—announcing more than 20 programs to develop and deploy new strategic nuclear systems or modernize

Soviet legacy systems. These include multiple systems for every leg of the Russian nuclear triad as well as two possible systems extending beyond the triad: a hypersonic glide vehicle and a nuclear-armed and powered undersea delivery vehicle. These Russian developments pose unprecedented challenges to Western deterrence and assurance goals.

Putin and his small inner circle—poised to continue controlling Russian defense and foreign policy for years to come—are inherently anti-Western and have named the United States and the North Atlantic Treaty Organization (NATO) as priority threats. Potential flashpoints between Russia and NATO span Eastern Europe and certainly include the Baltic States as well as the Middle East.

China

Under the leadership of President Xi Jinping, China has redoubled its efforts to achieve hegemony in Asia and, correspondingly, continued its military buildup, including nuclear weapons. The precise size and nature of China's nuclear arsenal—like its nuclear doctrine—remain opaque. China certainly controls at least several hundred nuclear weapons, both strategic and theater missiles, and is committed to nuclear modernization, including a new ballistic-missile submarine and a new generation of strategic bombers.

Official Chinese declaratory policy includes a no-first-use nuclear policy emphasizing the ability to survive a nuclear attack and respond with unacceptable damage on an enemy. However, there are considerable doubts about the reality of this expressed Chinese commitment to no first use; many analysts tend to believe that China's actual policies are more flexible.

North Korea

Post–Cold War hopes that the DPRK would collapse peacefully or slowly reform have not been realized. North Korea openly defies UN resolutions and international sanctions with provocative military behavior and threatening rhetoric, including nuclear threats. North Korea's continued development of nuclear weapons and long-range ballistic missiles—linked to its overarching goals of regime preservation and unifying the Korean peninsula under its control—place the regime in fundamental opposition to US and allied interests in the Pacific.

Under the solidified leadership of Kim Jong Un, North Korea's nuclear forces appear to be increasing both in quantity and quality. The DPRK has tested a nuclear device five times in recent years and, while open estimates vary, the country may have enough fissile material to produce 50–100 weapons by 2020. It also remains committed to developing long-range missiles capable of reaching US territory.

Officially, North Korea claims that its nuclear capability is meant for defensive or retaliatory purposes, but its explicit nuclear threats appear to reflect hostile intent, and little is known with certainty about how the DPRK's leaders might employ nuclear weapons. Certainly the regime continues to leverage its nuclear program for coercive diplomacy and to bolster its international standing.

Iran

Despite the Joint Comprehensive Plan of Action (JCPOA), Iran retains the potential to become a nuclear power in relatively short order. The JCPOA does not limit potential nuclear delivery vehicles such as missiles, and Iran reportedly continues to invest heavily in their development. Its recent satellite launches suggest that long-range missile development remains part of these efforts as well. Technology sharing between North Korea and Iran also is of great concern.

Nonstate actors

Open-source reports indicate terrorist groups so far have been unsuccessful in obtaining a nuclear weapon or the materials needed to assemble one. Should this change, however, the threat to the United States and its allies could be immense and immediate—and so this possibility must remain a high priority in US nuclear thinking.

Previous nuclear reviews anticipated a more benign nuclear threat environment in which nuclear weapons and nuclear deterrence were expected to play ever-diminishing roles. Today however, this expectation should not serve as a planning assumption for the new NPR. The four countries noted above pose a wide spectrum of threats, especially nuclear, to the United States and allies. Perhaps equally significant, however, are the great uncertainties pertaining to the scope of threats that will develop in coming decades. The United States must acknowledge and prepare for potentially divergent and wide-ranging threats in the

highly dynamic threat environment that has now followed the immediate post–Cold War period.

Nuclear Policy and Purpose

The general purposes of US nuclear capabilities—and therefore the goals of nuclear policies—have been remarkably consistent over time and certainly since the first NPR in 1994. Of particular importance are deterrence of enemies, assurance of allies, and defense or damage limitation in the event of war. It is important to understand the ongoing salience of each of these purposes.

Deterrence

Defined by the DOD 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," deterrence has been a central purpose of US nuclear policy and capabilities. Going back to the 1948–49 Berlin crises and the 1962 Cuban Missile Crisis, considerable evidence exists that nuclear deterrence helps uniquely to prevent war or the escalation of conflict between countries. And even with regard to nonstate actors, deterrence can help to dissuade adversary countries from providing technical or material assistance to dangerous groups.

In a highly dynamic threat environment, to the extent possible, US deterrence policies must also be highly adaptable: capable of being "tailored" to the various requirements posed by a shifting spectrum of opponents and contingencies. Such adaptability, in turn, rests on the availability of a flexible nuclear-force posture that provides US presidents with a range of deterrent options that not only deter but also could help limit damage to civilian populations and society in the event deterrence fails.

Assurance

While the primary audiences for US deterrence messages are adversaries, nuclear assurance addresses itself to allies and partners by creating or reinforcing confidence among them regarding the US ability and will to help preserve their security against external threats. The United States extends nuclear assurance commitments to more than 30 countries, particularly in Europe and Northeast Asia. It provides confidence to allies

that their security does not require their development of independent nuclear arsenals. Thus, assurance contributes to nonproliferation—preventing the adoption of nuclear weapons by additional countries or a numerical increase in the number of nuclear weapons—which remains a vital goal.

As with deterrence, assurance depends not only on the credibility of the US commitment but also on the flexibility of available options. While some allies may have doubts that the United States would risk all-out strategic nuclear war involving the American homeland to defend their territory, sub-strategic US nuclear and nonnuclear capabilities deployed in their vicinity can help provide important assurance effect.

Damage Limitation

In the event that deterrence fails, damage limitation continues to be a US policy priority reinforced by nuclear capabilities. And, as a practical matter, in the event deterrence fails, damage limitation will likely be the highest US priority. Numerous public policy documents in the past have identified damage limitation as a priority US goal. The Obama administration's 2013 *Report on Nuclear Employment Strategy of the United States* implicitly identifies it as such.

A potential means of limiting damage is so-called intra-war deterrence, in which the priority goal during an ongoing conflict is to reestablish deterrence and thereby minimize escalation and damage to US and allied military, political, and societal assets. While reestablishing deterrence following initial conflict can never be considered a certain outcome, it is most likely to be achieved if the United States has a range of limited nuclear and nonnuclear options at its disposal that can provide a response scaled to any level of attack. Active defenses, such as ballistic missile and air defenses, also contribute directly to the goal of damage limitation.

Declaratory Policy

The primary purposes of declaratory policy are to signal US deterrence goals and expectations with regard to nuclear forces and to help thereby deter foes and assure allies. Such statements form an essential component of US deterrence and assurance strategies, and their content and evolution should be considered as such in the forthcoming NPR. Current US declaratory policy stems from the Obama adminis-

tration's response to a 2009 review undertaken by the bipartisan Strategic Posture Commission (the Perry-Schlesinger Commission). At that time, the United States reasserted traditional positive security guarantees: the commitment to come to the aid of allies under attack. It also reasserted traditional negative guarantees, with a modification, promising not to employ nuclear weapons against countries that are parties to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) "and in good standing with their nuclear nonproliferation obligations." The United States rejected declarations of "no first use" (the promise that the United States would employ nuclear weapons only in response to a nuclear attack) and "sole purpose" (the statement that the sole purpose of US nuclear capabilities is to deter nuclear attack). Instead of no-first-use or sole-purpose declarations, the United States retained its traditional approaches of calculated ambiguity surrounding the employment of nuclear weapons and the application of nuclear deterrence to a spectrum of severe threats to the United States and allies.

Rejecting no-first-use and sole-purpose declaratory policies remains prudent. A no-first-use declaration would unsettle US allies and weaken deterrence by making conventional attack on an ally appear less risky. Correspondingly, it also would likely contribute to further nuclear proliferation incentives by undermining US assurance goals. A sole-purpose declaration would be extremely imprudent as long as significant biological, chemical, and large-scale conventional threats continue to exist as possible contingencies to be prevented via nuclear deterrence. Retaining current US policies regarding nuclear-alert status and the option for "launch under attack" should also be retained.

The United States, however, should consider greater clarity and specificity regarding its declaratory nuclear policy in some cases. In the face of Russia's escalate-to-win concept and China's increasing military power and expansionism, more specific deterrent threats may be needed to strengthen deterrence and assurance. This would involve the United States and allies more clearly articulating a consensus on nuclear deterrence policy and options to prevent various possible levels of escalation. Calculated ambiguity may remain, but deterrence at lower levels of possible escalation could be served by a variety of measures, including public signaling of NATO and allied cohesion and nuclear exercises.

The United States must clarify once again that it will maintain the capabilities needed to design, develop, produce, certify, and, as necessary,

deploy nuclear weapons in support of national deterrence and assurance goals. US intentions in this regard appear to have become uncertain in recent decades, unsettling some allies and leading adversaries to conclude that this is an advantageous area in which to challenge the United States.

Declaratory policy remains a vital component of nuclear deterrence and assurance goals. It should contribute to, not limit, US adaptability. Current US declaratory policy is appropriate to today's security environment and does not require significant overhaul.

Adaptability as Policy and Purpose

The current security environment, the purposes of US nuclear capabilities in response to that environment, and the reality of lengthy acquisition cycles for new weapons systems combine to make adaptability an essential metric for US planning and nuclear capabilities supporting deterrence, assurance, and damage limitation. It encompasses flexibility to adjust to different adversaries, contingencies, and employment plans, as well as resilience, which allows national leaders to adjust the force posture in response to adverse military, political, or technological changes. In practice, several nuclear-force posture attributes reinforce flexibility and resilience. These include survivability (the ability of nuclear forces to withstand or escape attack), suitable range, ability to forward deploy (closer to adversaries and allies alike), prompt response capability, variable payloads (e.g., the ability of ballistic missiles and bombers to carry different types and numbers of weapons), assorted weapon yields, and high delivery accuracy.

In addition, several other factors enhance the resilience of the US nuclear force posture. For example, the existing force structure's diversity and readiness are a key factor, including its "triad" of land-based, sea-based, and airborne delivery systems. The ability to adjust the size and alert levels of the deployed force—by bringing weapons out of stockpile if necessary, for example—is important as well. And, the potential to modify existing capabilities through straightforward hardware changes also can enhance adaptability.

In summary, adaptability in general should be made a guiding metric for the evaluation of US nuclear policy, planning, and force structure; its preservation and enhancement in these elements should be a primary theme in the 2017 NPR.

Adaptability and Nuclear Modernization

The United States is in the initial stage of a planned nuclear-force modernization program. The program will encompass all elements of the force, require a budget of hundreds of billions of dollars over the next quarter century, and affect US capabilities for deterrence, assurance, and damage limitation for decades. Here we briefly outline key components of present and planned US nuclear forces as discussed publicly and evaluate the changes expected from the modernization program against the metrics of adaptability described above. We also consider aspects of technology development and the nuclear-weapons infrastructure that are in need of modernization. The potential effects of key force changes are summarized with reference to the adaptability criteria.

Survivability. Force survivability is a matter both of escaping or withstanding attack (pre-launch survivability) and penetrating defenses that could impede an effective response (post-launch survivability). The force-modernization program, as reported publicly, will not change the survivability level of US ballistic missile submarines (SSBN) in port. Nor will it change the survivability of bombers and dual-capable aircraft (DCA) at air bases, or intercontinental ballistic missiles (ICBM) in silos. The *Columbia*-class SSBN, however, is designed for greater at-sea survivability than its *Ohio*-class predecessor. The B-21 bomber, long-range standoff missile (LRSO), and F-35A DCA are all designed for greater post-launch survivability against advanced air defenses than their existing counterparts. And the planned ground-based strategic deterrent missiles are expected to be more survivable after launch than the existing Minuteman III.

Suitable range. Current submarine-launched ballistic missiles (SLBM), ICBMs, and bombers have intercontinental ranges and—while the ranges of next-generation systems have not been revealed publicly—it is reasonable to expect that their ranges will be similarly intercontinental. In the same way, the LRSO may be expected to have an intermediate range comparable to the current air-launched cruise missile (ALCM-B) and retired Advanced Cruise Missile. DCA typically have shorter ranges than bombers (and open-source estimates suggest the F-35A will be no exception) but can be forward deployed and refueled in flight to extend range.

Ability to forward deploy. Bombers and SSBNs are the forward-deployable legs of the US nuclear triad, and DCA can assume forward-

deployment duties as well. Historically, both bombers and submarines have been sent abroad on visible "presence" missions to deter foes and assure friends. Other than possible concerns about their security in foreign locations or the revelation of their design elements, nothing would argue against the use of next-generation systems in similar ways. And, of course, the F-35A strike fighter should be entirely capable of assuming its predecessors' forward-deployment roles.

Prompt response capability. Prompt response involves the ability to reach targets from long range in minutes rather than hours. As reported publicly, this capability certainly will be sustained in next-generation ICBM and SLBM systems expected under the modernization program.

Variable payloads. Today, SLBMs and ICBMs are capable of carrying two types of reentry-vehicle warheads. Follow-on missiles envisioned in the modernization program could carry as many as three warhead types. The future bomber force, as reported publicly, will continue to carry cruise missiles—LRSO missiles in place of ALCM-Bs—but there will be fewer types of gravity bombs as most variants of the B61 bomb are retired. The future bomber force also will retain significant "uploading" capacity, to take on additional warheads and bombs if conditions warrant.

Assorted weapon yields. This aspect of adaptability also will not change significantly, with future SLBMs and ICBMs, as openly reported, still being armed with warheads of high (reportedly hundreds of kilotons or more) yield, while bombers reportedly will carry weapons of both high and low yields.

High delivery accuracy. Though improvements in the next generation seem likely, current SLBMs and ICBMs already boast accuracy reported to be within a few hundred feet of their intended targets. The modernization program is likely to impact the delivery accuracy of gravity bombs in a future force, since the follow-on B61-12 gravity weapon includes a guided tail-kit section designed to improve accuracy, as openly reported.

Technology development and rebuilding infrastructure. Beyond the replacement of aging weapons systems themselves—as planned in the modernization program—the United States also must grapple with the need to maintain and, in some cases, restart technology-development efforts surrounding our nuclear forces and to rebuild necessary infrastructure.

Examples of technologies in which the United States may face the choice of either competing or losing key competencies to adversaries include antiballistic missile defenses, cruise-missile technology and hypersonic delivery

vehicles, space-control capabilities, nonnuclear offensive technologies such as railguns and lasers, and command-and-control systems.

In addition, as US production of nuclear weapons in recent decades has ceased, the larger intellectual infrastructure needed to design, manufacture, and produce nuclear systems also has atrophied, creating what a growing number of observers believe are risky gaps between US capabilities and those of adversaries whose nuclear-technology programs continued apace. The US nuclear-weapons stockpile today is the smallest since the Eisenhower administration, and a comprehensive approach to sustaining overall nuclear readiness does not appear to exist. Addressing these areas of need in the 2017 NPR will contribute to overall US flexibility and resilience. The accelerating replacement of the two critical US nuclear-material production facilities should be an urgent priority. The United States reportedly has not had a fully operational plutonium or uranium production complex since 1989. Finally, US nuclear command, control, and communications systems—including early-warning sensors, mobile and fixed command-and-control centers, and communications links between deployed nuclear forces and national leaders—remain in urgent need of modernization.

In summary, the existing US nuclear modernization program is critical to sustaining the adaptability of US nuclear forces needed to support the priority national goals of deterrence, assurance, and damage limitation. The greatest virtue of the planned modernization program in this regard will be to preserve the flexibility and resilience inherent in the US nuclear triad for decades to come as production lines reopen and new systems replace those whose practical lifespans are ending. The NPR also should consider possible changes to the current modernization program to achieve greater adaptability suitable for circumstances in which threats are emerging beyond what has been expected, more funding becomes available, new technological opportunities appear, or threat conditions dictate that US capabilities must be improved at a faster-than-planned pace.

Missile Defense

Ballistic missile defense (BMD) is widely recognized as a critical component of national and regional security and has the potential to contribute significantly to deterrence, assurance, and damage limitation in a dynamic strategic environment. Strategic missile defenses were severely

restricted by treaty for 30 years on the assumption that they undermined "stable" mutual deterrence. However, missile threats facing the United States and its allies have been expanding for decades, and homeland and regional defenses now are accepted as essential contributors to security. Indeed, BMD can support all three priority purposes of US nuclear capabilities in general:

Deterrence. BMD can contribute to deterrence in several ways. First, it may provide the United States with very useful alternatives to offensive preemption or retaliation in crises. This was the case, for example, in the days prior to North Korea's 2006 Taepodong-2 launch, when the deployment of a limited US homeland-defense system gave President Bush an alternative to a preemptive strike on the North Korean missile site (as was recommended by some at the time). Second, by helping to deny adversaries plausible limited nuclear first-use options against US allies and the US homeland, BMD can discourage even determined opponents from pursuing such dangerous strategies and deny their effectiveness in cases where opponents choose such strategies. Third, by relieving pressure to strike an adversary's launchers preemptively in crises, effective BMD also can buy time for leaders to pursue diplomacy or nonnuclear means of averting or limiting escalation in an emerging nuclear crisis. Finally, point defense for critical military assets at home and abroad can enhance the survivability of US and Western deterrence forces that an adversary otherwise might believe it could eliminate by preemptive attack—thereby strengthening deterrence and discouraging opponents from dangerous first-strike concepts.

Assurance. First, by reducing the potential costs of conflict with an ICBM-capable adversary, missile defense of the US homeland can improve the credibility of US security guarantees to allies by helping to counter an opponent's possible expectation that nuclear threats to the US homeland will work to decouple the United States from allies. Second, regional missile defenses help to reinforce assurance by providing local defensive capabilities while demonstrating the US security commitment. Finally, the cooperative process of developing and deploying missile defenses helps to build stronger alliance relationships and gives the United States a larger presence in, and commitment to, allies' security.

Damage limitation. Missile defenses can contribute to damage limitation by helping to discourage an adversary from escalating a conflict and by providing a potentially meaningful degree of direct societal

protection in many plausible conflict scenarios. BMD also can provide unique damage-limitation capabilities against the possibility of an accidental or unauthorized missile strike. Finally, BMD can help provide a relatively near-term counter to the emerging North Korean missile threat—a defensive alternative to the option of a preemptive strike often discussed publicly. In addition, BMD may contribute to the goal of dissuading some adversaries from acquiring missile capabilities in the first place. For example, the prospect of strong US BMD against long-range ICBMs from Iran or North Korea could help discourage their continued investment of scarce resources in the development of such weapons.

In short, far from being an impediment to deterrence, BMD has emerged as a potentially crucial element in support of deterrence—particularly with regard to smaller and more unpredictable nuclear adversaries. BMD can also contribute uniquely to US assurance and damage-limitation goals. Recommendations for consideration to help improve the contributions of BMD to deterrence, assurance, and damage limitation include, for example: improving and expanding US capabilities for homeland defense, including defense against cruise missiles and potentially hypersonic missiles; expanding and accelerating SM-3 capabilities; the fielding of a space-based layer of sensors for persistent "birth-to-death" missile tracking and discrimination; providing operational capability to the Aegis Ashore Missile Defense Test Complex in Kauai, Hawaii; and, *inter alia*, continuing readiness efforts for a possible East Coast BMD site.[5]

Arms Control and US Goals in the New Threat Environment

Arms control is a long-standing element of nuclear policy, and its content and usefulness in the current security environment must be considered. In general, however, Russia has not been a cooperative or trustworthy arms control partner for many years. It has rejected recent US arms control overtures in strong terms, and both Russia and China currently pursue aggressive, expansionist foreign policies—backed by growing nuclear arsenals—at the expense of US allies. These conditions do not make for a promising arms control environment and suggest that a key requirement of US arms control efforts in the coming years must be to strengthen US deterrence, assurance, and damage-limitation capabilities by contributing to the adaptability of US nuclear capabilities rather than seeking continued numerical nuclear force reductions

in the pursuit of nonproliferation as the "top" nuclear policy objective. In addition, US allies and partners should be consulted closely on arms control efforts to reinforce the vital assurance goals of nuclear policy.

The supposed linkage between continuing US nuclear reductions and the advancement of US nonproliferation goals is a myth. Widespread belief that US nonproliferation goals demand continuing US nuclear reductions and limitations has had a significant effect on US nuclear policy for many years. Contrary to this widespread belief, however, available evidence suggests strongly that the reduction of US nuclear capabilities and their limitation does not advance nonproliferation. Rather, it may in fact contribute to proliferation by motivating some allies under threat in the current environment (particularly in Asia) to consider acquiring their own independent nuclear deterrence capabilities. Instead of focusing the US arms control agenda on further US nuclear reductions for nonproliferation purposes, the United States should instead emphasize proven approaches to minimizing and countering proliferation, such as extending credible nuclear deterrence to allies, denying other countries the technology required to produce nuclear weapons, addressing the actual factors that motivate countries to pursue nuclear weapons in the first place, and pursuing a variety of defensive measures to protect against proliferation.

A set of basic principles for the United States with regard to further arms control or limitation agreements should include:

1. Arms control should not be pursued for its own sake and/or necessarily for the elimination of nuclear weapons but rather to advance the traditional goals of arms control: reducing the probability of war, the consequences of war, and the cost of maintaining adequate defense capabilities. As such, a primary goal of US arms control policy now should be to advance the adaptability of US capabilities so as to strengthen their support for US deterrence, assurance, and damage-limitation goals.
2. The US arms control agenda should not be bound by the 2013 US proposal for further reductions of up to one-third of US deployed strategic weapons.
3. If US-Russia nuclear arms control negotiations again become feasible, then nonstrategic nuclear forces also must be included.

4. Effective verification and enforcement of agreements is essential, and the United States should not consider new arms control steps as long as Russia remains in persistent and stark noncompliance with existing agreements.
5. The United States should avoid reestablishing treaty limits on missile defense.

The United States should continue adhering to the New START Treaty through its 2021 end date as long as Russia remains in compliance. If Russia does not comply with New START, then the United States should mitigate the consequences and strengthen US adaptability outside the treaty as necessary. The Trump administration also should review the existing US position in support of the Comprehensive Test Ban Treaty; the National Nuclear Security Administration should, for the sake of prudence, be directed to improve its readiness for testing—even if there is no immediate need to resume nuclear testing. Finally, where feasible, the United States should explore cooperative endeavors with Russia and the PRC, such as participation in the Global Initiative to Combat Nuclear Terrorism.

The United States must be clear-eyed about its own goals, the intentions and trustworthiness of its arms control interlocutors, and the essential requirement for verification and enforcement of all existing and prospective arms control endeavors. It should consider using available arms control venues and cooperative possibilities to explore new options to reduce the probability of war, the destructiveness of war, and the cost of sustaining adequate deterrence, assurance and defense capabilities.

How Much Is Enough?

The size of a future US nuclear force is likely to be a key consideration in the forthcoming NPR. The specification of "how much is enough" in terms of nuclear force numbers has been an enduring question addressed in previous NPRs. A "minimalist" school of thought has long argued for no more than the force size necessary for a retaliatory threat to an opponent's society, in response to an attack by that opponent. Such a threat is said to be adequate for US deterrence requirements while demanding a relatively small number of US nuclear weapons, typically ranging from a few dozen weapons to hundreds. A number of reasons

exist to reject the minimalist approach to answering the question of US nuclear force sizing:

1. Declaring a low specific number of weapons as adequate for US deterrence needs because it meets the requirements to threaten an opponent's society reflects a basic misconception of deterrence. No one can know the "minimal" number of nuclear weapons necessary to deter credibly, and even if known, the number likely would change on a continuous basis due to shifts in force structure, weapons technology, the opponent's worldview, the stakes of the conflict, context, and numerous other factors. This is the reason deterrence strategies must be sufficiently flexible to be tailored to specific contexts, not predicated on a static minimalist concept.
2. A minimal number of weapons may not be sufficiently large and diverse to discourage first-strike strategies and planning by a determined opponent. The consensus of Democratic and Republican administrations for 50 years has been to maintain a diverse and, in some ways, overlapping triad of strategic nuclear forces to ensure the survivability of US forces, as is necessary for deterrence, and thus discourage opponents from considering first-strike strategies, and to preserve credible deterrence even in the face of an opponent pursuing such a strategy.
3. The minimalist focus on threats to civilians and other societal targets as the measure of effective US deterrence capabilities is widely considered immoral, a violation of international law, and likely to be viewed as a noncredible US deterrent by some opponents.
4. A minimal force number oriented to threatening societal destruction would provide little flexibility to hold at risk other assets that an opponent's leadership might value more than civilian centers, such as military or political control targets. Thus, such a minimal deterrent could be inadequate and an imprudent approach to deterrence and assurance.
5. A minimal force would provide a future US president the most miserable option if deterrence fails—that of responding against an opponent's society with remaining forces—at the expense of other targeting options that could more likely help limit escalation of the conflict and avoid further counterstrikes from the opponent.

6. A minimal nuclear force needed to threaten society likely would be seen as wholly insufficient for assurance by at least some allies under the US nuclear umbrella.

In summary, the US goal must be for nuclear deterrence and assurance to work as effectively as possible in all cases and to limit escalation to the extent possible should deterrence fail. This demands the rejection of a minimalist approach. In the forthcoming NPR, recommendations regarding US nuclear force numbers should *not* aim for a hypothetical minimum derived from only the requirements for holding societal targets at risk, fixed budget numbers, or other static boundaries. The standards of adequacy for multiple nuclear policy goals in severe, diverse, and shifting conditions can never realistically be considered fixed. Instead, numbers should be the product of a careful assessment of the dynamic security environment and US purposes within it.

Affordability of Nuclear Deterrence

The cost of US nuclear capabilities ultimately must be judged against the value they provide in support of US national goals—especially deterring war, assuring allies, and limiting damage if deterrence fails, particularly by preventing the escalation of conflict. In that light—and considering the likely consequences of a nuclear attack—the value of nuclear capabilities needed to support these goals may be judged as virtually infinite.

Infinite resources, however, are not available for any purpose, of course. And after decades of very limited investment in nuclear capabilities, today's estimated costs for the simultaneous modernization of the US nuclear triad appear especially daunting, reportedly ranging from roughly $400 billion over the next 10 years to as much as $1 trillion over the next three decades. Critics of such spending levels contend that nuclear forces are inappropriate to meet new twenty-first-century threats, should be minimized rather than upgraded to avoid wider global nuclear proliferation, and will lead to the starvation of needed investments in conventional forces. However, investments in US nuclear-force modernization are, in fact, affordable and necessary; they should not rise beyond 5 to 7 percent of the US defense budget, even at the estimated peak of likely spending in the coming years. This projection is well within and even below historic US spending patterns for such forces.

Moreover, critics of nuclear-investment costs greatly underestimate the unique value of nuclear forces in sustaining deterrence against the most dangerous threats and adversaries. US nuclear forces help deter existential nuclear threats to the homeland and to our allies. They provide a deterrent against the use of other types of weapons of mass destruction—including chemical and biological agents—against which the United States no longer possesses the ability to threaten comparable retaliation. They help cement US alliances by strengthening US security guarantees to allies and strategic partners. And, by deterring an opponent's escalation, they underpin the US goal of damage limitation in the event of conflict and the US freedom to use conventional forces effectively to protect American interests.

In the near term, to protect long-overdue investments in nuclear forces Congress must consider relief from the budgetary caps imposed (through so-called sequestration) by the Budget Control Act of 2011. If current budget law is not amended, the new administration should use executive authority to exempt spending on nuclear forces from the mandatory sequestration cuts. Over the longer term, building the kind of public and intragovernmental consensus necessary to sustain investments in needed US nuclear capabilities requires novel budgeting approaches. These could include the creation of a mandatory nuclear-insurance policy—amounting to a fixed portion of defense spending—or the establishment of a "strategic deterrence fund" to cover modernization needs over longer periods of time and thereby create efficiencies.

More fundamentally, policy makers must counter the widespread lack of understanding in key US constituencies about the importance of nuclear capabilities. Senior-level political and military leaders must make a consistent and systematic effort to educate the US Congress, the general public, and the uniformed military about the overwhelming value of nuclear forces to support the country's priority security goals. Funding the US nuclear force and modernization programs is both necessary and affordable. Failure to do so would increase the risk of intolerable consequences to the nation.

Regional Security Issues for the New NPR

After the collapse of the Soviet Union, NATO reduced but by no means eliminated the role of nuclear weapons in its military strategy and deterrence posture. In light of the resurgent threat from Russia, particu-

larly since 2014, nuclear policy and its contribution to deterrence and assurance once again are major topics within the alliance. Moscow's ongoing nuclear modernization programs and its emphasis on the nuclear first use or "escalate-to-win" option—effectively the threat or limited use of nuclear weapons to coerce NATO into backing down in a conventional conflict—create concerns in NATO and a corresponding desire to strengthen deterrence and assurance. The NPR and possible revisions of NATO's 2012 Deterrence and Defense Posture Review are opportunities for clarity and direction.

The renewed adversarial relationship with Russia and the apparent narrowing of Western nonnuclear military advantages mean that the United States and NATO need to reexamine and possibly revise their nuclear policy and posture. Key issues include: the future of US nuclear forces designated for NATO, especially the US B61 bomb and the aircraft used to carry it; changes to the alliance's declaratory policy on the role of nuclear forces; involvement of additional NATO member states in nuclear-sharing arrangements; and readiness levels and deployment locations throughout the alliance. The overarching deterrence goal in this regard is to deny Russia any plausible basis for perceiving exploitable political or military advantages that could lead Moscow to consider aggression or nuclear escalation against the West, even in crises. The following are select recommendations for consideration:

1. In its forward-deployment decisions and declaratory policy, the United States and NATO must repeatedly make clear the indivisibility of the alliance and its nuclear policy: that an attack on one is an attack on all and that any Russian nuclear escalation against the West would be the worst possible course for Russia under any circumstances.

2. The B61 life-extension bomb, the B61-12, reportedly will be the only US nuclear weapon based in Europe with precision accuracy and a low-yield option. Therefore, it should not be subject to further procurement delays but instead should be advanced to the extent possible.

3. Availability of the nuclear-capable F-35A aircraft should be accelerated to provide NATO with the stealth technology to counter Russian air defenses and thereby enhance its deterrence credibility.

4. Nuclear burden sharing—especially in the deployment and support of nuclear capable aircraft, should be widened in NATO, particularly including the former Warsaw Pact countries of Eastern Europe.
5. The United States should consider deploying substrategic missiles at sea in the NATO region or on NATO territory to increase the adaptability of its nuclear deterrent.
6. The United States and NATO should prioritize creation of an integrated air and missile defense system for the alliance to help make a limited Russian nuclear attack unacceptably difficult and risky.

In summary, US nuclear forces deployed in Europe must continue to serve the dual purpose of underpinning deterrence (by posing the threat of incalculable costs in the mind of a potential aggressor) and assuring allies in the face of nuclear coercion. Adjustments to US and NATO capabilities and declaratory policy to meet these essential purposes and advance Western adaptability should now be considered.

Implications for Asian Security

Asia continues to constitute a highly dynamic security environment. With regard to US nuclear policy and posture, four imperatives stand out.

A Nuclear- and Missile-Armed North Korea Must Be Countered

This is a considerable challenge since—during the plausible time horizon of the NPR—the DPRK reportedly could emerge with a nuclear force of between 60-100 weapons, deployed on a mix of short- and long-range delivery systems. Meanwhile, the country continues to be led by an eccentric, opaque, and unpredictable dynastic regime.

US nuclear capabilities have long played a central role in deterring North Korean aggression and in assuring Asian allies, and they will continue to do so. Forward-deployable strategic weapons in the US triad provide essential support for these goals—to signal US resolve to North Korea and to allies, and to help limit escalation in the event of conflict. Additional US nuclear capabilities—nuclear capable aircraft hosted at Japanese and South Korean bases—may be important for deterrence of the DPRK. In addition, the United States should retain the ability to deploy nuclear-capable bombers in the region and demonstrate the capability for stand-off attack with stealthy delivery systems such as the

LRSO. A low-yield nuclear weapon that could be delivered promptly against defended North Korean airspace also should be considered.

Finally, US and allied missile defenses must help counter North Korean missile threats and defend against missile attack if deterrence fails.

Chinese Expansion at the Expense of US and Allied Interests Must Be Deterred

China's assertiveness in declaring control of contested islands and a widening swath of ocean has occurred in recent years alongside the expansion and modernization of its nuclear force. While China remains the least transparent of the P-5 nuclear powers, its historical reliance on a small fleet of silo-based ICBMs clearly has given way to a mix of silo-based and mobile ICBMs and sea-based SLBMs, as well as a possible role for a nuclear bomber. This shift will give China more nuclear options, and more discriminate nuclear options to deter and coerce the United States and allies in its bid for regional hegemony.

China's growing assertiveness, expanding nuclear posture, and uncertainties about its future course may well create new nuclear requirements for the United States and the corresponding need to determine whether, when, and how to deploy additional capabilities. The United States must sustain capabilities with the requisite flexibility and resilience to deter China at many possible levels of escalation, and limit damage should deterrence fail.

Assurance of US Allies in Asia Remains of Vital Importance

Assurance is based on allied confidence that the regional deterrence strategies of the United States, Japan and South Korea are credible and supported by the necessary US and allied capabilities. Formal extended-deterrence dialogues begun by the United States in 2010 appear to have had a positive impact in this regard and should be continued. The United States should consider going further to implement "NATO-like" nuclear consultation with Northeast Asian allies. The United States also should continue to press Japan and South Korea for trilateral cooperation, which would likely have a powerful effect signaling resolve against potential Chinese and DPRK aggression, and thus contribute to deterrence.

Consideration of Rising Nuclear Dangers in South Asia Remains Important

Though the United States does not have an alliance-based role in deterring aggression between India and Pakistan, US interests are involved. The possibility of a Pakistani nuclear weapon falling into the hands of terrorists is a particular concern. Therefore, US policy should continue to encourage dialogues between India and Pakistan on nuclear issues and to emphasize preparations for an emergency response to the loss of control of one or more Pakistani weapons.

In summary, as nuclear capabilities and military threats continue to grow in Asia, US nuclear forces will play a more important role in supporting key deterrence and assurance goals. Recommended here are considerations for strengthening the capabilities needed to support these goals and advance the adaptability of US forces and strategy.

Summary and Conclusion

The 2017 NPR represents an opportunity for the United States to adjust its nuclear policy direction to the new realities of the post–Cold War world. The three previous NPRs (1994, 2001, and 2010) understandably reflected their times and the expected more benign nuclear threat environment of the immediate post–Cold War period. The overriding presumption of each was that nuclear deterrence and nuclear weapons were of decreasing relevance to US and allied security because the threat environment had fundamentally changed with the collapse of the Soviet Union and Warsaw Pact and the rise of terrorism. The new realities of the threat environment, however, are very different from those of the immediate post–Cold War period. Today's contemporary threat environment is highly dynamic, and self-declared opponents have embarked on foreign policies designed to overturn the existing international order, elevated the roles of nuclear weapons in support of these policies, and continued to modernize and expand their nuclear arsenals. The hoped-for "new world order" has been superseded by the emergence of a new threat environment that is more dangerous than the Cold War in many ways, including new nuclear threats and the apparent growing likelihood of nuclear escalation. These developments have seriously unsettled key US allies, particularly those geographically close to Russia, China, and North Korea.

US nuclear policy must shift with these new realities and again promote as priority goals the deterrence of enemies, the assurance of allies, and the limitation of damage in the event deterrence fails. Given these realities, US nuclear capabilities and strategies to support these priority goals must be adaptable to the vicissitudes of a highly dynamic threat environment and the great variability in opponents and contexts. Correspondingly, the two components of adaptability, flexibility, and resilience must be priority metrics for US nuclear strategy, forces, and infrastructure. Advancing flexibility and resilience across US nuclear policy will provide the most prudent basis possible for having the capabilities and strategies needed to meet diverse and shifting nuclear demands.

The need to adapt to new threat realities has implications across virtually all facets of US nuclear policy. It is obvious in the need to reconsider how best now to deter opponents and assure allies in Europe and Asia and in the need to reorient US arms control and declaratory policies away from their focus on progressive reductions and limitations for nonproliferation and nuclear disarmament purposes and toward supporting the priority goals of deterrence, assurance, and damage limitation for decades to come. SSQ

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Notes

1. Department of Defense, *Nuclear Posture Review Report* (Washington, DC: Office of the Secretary of Defense, April 2010), vi, https://www.defense.gov/Portals/1/features/defenseReviews/NPR/2010_Nuclear_Posture_Review_Report.pdf.

2. Statement of James Miller, principal deputy undersecretary of defense for policy, in House, *The Current Status and Future Direction for U.S. Nuclear Weapons Policy and Posture: Hearing before the Subcommittee on Strategic Forces of the Committee on Armed Services*, 112th Cong., 1st sess., 2 November 2011, 62, https://fas.org/irp/congress/2011_hr/nw-posture.pdf.

3. Ashton Carter, "Remarks by Secretary Carter to Troops at Minot Air Force Base, North Dakota," Defense.gov, 26 September 2016, https://www.defense.gov/News/Transcripts/Transcript-View/Article/956079/remarks-by-secretary-carter-to-troops-at-minot-air-force-base-north-dakota/.

4. White House, "Presidential Memorandum on Rebuilding the U.S. Armed Forces," press release, 27 January 2017, https://www.whitehouse.gov/the-press-office/2017/01/27/presidential-memorandum-rebuilding-us-armed-forces.

5. "Schatz Introduces Bipartisan Bill to Boost Homeland Missile Defense," *Big Island Now*, 22 May 2017, http://bigislandnow.com/2017/05/22/schatz-introduces-bipartisan-bill-to-boost-homeland-missile-defense/. It should be noted that since initial distribution of *A New Nuclear Review for a New Age*, these recommended steps and more have been introduced in the bipartisan Advancing America's Missile Defense Act of 2017 proposed in the Senate.