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STRATEGIC ASSESSMENTS PROJECT
NATIONAL SECURITY ANALYSIS DEPARTMENT

The Johns Hopkins University
APPLIED PHYSICS LABORATORY

THE JOHNS HOPKINS UNIVERSITY NUCLEAR FUTURES PROJECT

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I. Introduction

Over the past several years, there has been considerable debate over the future of the US nuclear posture, and of nuclear weapons more broadly. On the one side are arrayed those who argue that the United States should commit itself to eliminating nuclear weapons worldwide. Deployed opposite them are those who argue that nuclear weapons retain political and military utility for the United States and others, and will continue to do so for the foreseeable future. To explore these arguments, the Johns Hopkins University (JHU) held a series of unclassified workshops to map the intellectual landscape regarding nuclear weapons. This was an academic exercise, undertaken by JHU without government sponsorship or input. The views of the participants were their own and not those of their institutions or organizations. It is hoped that the findings of this study will help to inform the public debate on the future of nuclear weapons.

I.I Background

The past several years have witnessed considerable debate over the future of nuclear weapons in general, and the US nuclear arsenal in particular. The current debate revolves around the political utility and military effectiveness of nuclear weapons. Nuclear abolitionists believe that nuclear weapons are useless, even harmful, politically as well as militarily. Nuclear traditionalists, by contrast, argue that nuclear weapons retain both political and military utility.

The desire to rid the world of the nuclear bomb is as old as the weapon itself, and there have been bursts of energy devoted to the disarmament cause at various times such as the early to mid-1980s. The most recent wave of nuclear abolitionism gathered force in January 2007 when George Schultz, Henry Kissinger, Bill Perry, and Sam Nunn wrote a newspaper column advocating a nuclear-free world. They argued that if the United States provides leadership and shows a good faith effort toward reducing and then eliminating nuclear weapons, nations that do not currently have nuclear weapons would forego them.¹

Writing separately, Sam Nunn likened the elimination of nuclear weapons to climbing to the top of a tall mountain, with the summit beyond our current grasp and perhaps even out of sight. He advocated moving to a higher base camp than

¹George P. Shultz, William J. Perry, Henry A. Kissinger and Sam Nunn, "A World Free of Nuclear Weapons," *The Wall Street Journal*, January 4, 2007, A15

our current position (meaning much deeper disarmament and related measures) to determine if we can later reach the summit.²

The global elimination of nuclear weapons has become the policy of the Obama administration. In a speech in Prague on April 5, 2009, President Obama said, "I state clearly and with conviction America's commitment to seek the peace and security of a world without nuclear weapons." He recognized that this "goal will not be reached quickly – perhaps not in my lifetime." But he pledged to take concrete steps to put the United States on a path toward that objective. This statement, and the concrete steps he identified at the time, define the agenda his administration has pursued to address the nuclear dangers facing the United States and the international community in the 21st century.

Abolitionists believe that the value of nuclear weapons is minimal, but the danger they pose is considerable. In their view, nuclear weapons are only useful for deterring a direct nuclear attack, and the need for even that would go away if nuclear weapons were eliminated. Moreover, they believe that the real threats that the United States faces today—terrorists armed with nuclear weapons—cannot be deterred with nuclear weapons. They believe that as long as nuclear weapons exist, there is a significant possibility that they will be used. Moreover, as long as nuclear materials exist, there is a chance that they will fall into the hands of terrorists who will use them. They assume that if a nuclear weapon is used, then the results will be catastrophic, not only in terms of lives lost, but also in terms of global norms and institutions for international cooperation. Finally, they argue that the development of long-range precision strike and ballistic missile defenses is permitting the United States to reduce and eventually end its reliance on nuclear weapons.

Others are not so sanguine about the possibility of eliminating nuclear weapons. Nuclear traditionalists believe that nuclear weapons remain politically useful and militarily effective. In their view, nuclear weapons have uses that go beyond deterring a nuclear attack on the United States. These include deterring attacks on US allies and insulating them from aggression from regional neighbors. They argue that American-extended nuclear deterrence guarantees have contributed to nonproliferation by easing the pressure on US allies to develop nuclear weapons of their own. Nuclear weapons may also have utility in deterring the use of chemical and biological weapons. Moreover, nuclear traditionalists argue that nuclear weapons remain the only way to destroy certain types of targets, such as hardened and deeply buried facilities. They also argue that a technology once invented cannot be uninvented.

Most fundamentally, nuclear traditionalists argue that nuclear weapons have contributed to the prevention of large-scale war. The existence of nuclear weapons, and the possibility however remote that they might be used, has on balance served as a stabilizing force in international politics.

²Former Senator Sam Nunn, Co-Chairman, Nuclear Threat Initiative, American Nuclear Society Annual Meeting, June 15, 2009, at http://www.nti.org/c_press/speech_Nunn_American_Nuclear_Society061509.pdf (accessed July 1, 2010)

Nuclear traditionalists argue (and abolitionists concede) that the current rhetoric in favor of eliminating nuclear weapons will not convince North Korea to give up its nuclear arms, will not sway Iran from desiring to acquire such arms, will not prevent states and transnational networks from proliferating nuclear technology, and will not prevent fissile material from falling into the hands of terrorists.

Professor Graham Allison of Harvard University, a former senior US Department of Defense (DoD) official, in a recent speech at the Johns Hopkins Rethinking Seminar,³ worried that along the way to the mountaintop of nuclear elimination, climbers might get hit by an avalanche. His concern is that the current nuclear abolitionist rhetoric will not affect the short-term problem of North Korean and Iranian efforts to become nuclear states, the dissolution of the Nuclear Non Proliferation Regime (NNPR), ongoing worldwide proliferation activities, or the potential of fissile material falling into the hands of terrorists.

Keith Payne, former Deputy Assistant Secretary of Defense for Forces Policy, has argued that retaining some level of nuclear weapons would be good since nuclear weapons have prevented major wars. Finally, history also indicates that a weapons capability and technology once developed cannot be undone. For example, the Catholic Church attempted to ban the use of the crossbow in 1139, yet Richard the Lionhearted would die of a crossbow wound some sixty years later.

The debate over nuclear weapons has unfolded against the backdrop of a changed nuclear landscape. Whereas for decades nuclear weapons were the exclusive property of a handful of powerful advanced states, today the ranks of the nuclear powers include the backward (North Korea) and the unstable (Pakistan). Today more than ever it is the weak rather than the strong that are seeking nuclear arms.

The relationship between nuclear and conventional weapons has also changed, both for the United States and for others, including potential adversaries. During the Cold War, the United States looked to nuclear weapons to offset the size and strength of the Red Army. Specifically, we relied upon nuclear weapons to deter a Soviet invasion of Western Europe as well as conventional attacks on other allies. Today, however, it is the United States that possesses conventional superiority over the full range of adversaries. It has demonstrated its prowess in a series of wars in Southwest and Central Asia and the Balkans. It has used its high-technology advantage to coerce others into giving up territory, as it did to Iraq in 1991 and Serbia in 1999, as well as to unseat hostile regimes, as it did in Afghanistan in 2002 and Iraq in 2003. US conventional superiority provides not only a powerful deterrent, but also a motivation for others to acquire nuclear weapons. It should not be surprising, therefore, that other states, including those who fear an attack by the United States, are seeking nuclear weapons as an equalizer.

³Graham Allison Speech given to the JHU/APL Rethinking US Grand Strategy and Foreign Policy Seminar Series, Feb 18, 2010. Video and notes at: <http://outerdnn.outer.jhuapl.edu/rethinking/Past-Series/Rethinking20092010.aspx>

Another defining feature of the strategic context is the imbalance in political stakes between the United States and potential adversaries. During the Cold War, the Soviet Union's nuclear arsenal represented an existential threat to the United States and its allies. Today the United States has limited stakes in many potential conflicts. For example, while a nuclear blast in a major US city would inflict horrendous casualties, it would not destroy the United States. By contrast, future adversaries are likely to see a conflict with the United States as a threat to their very survival. A war on the Korean Peninsula for example, would not put at risk the existence of the United States, even if P'yongyang were to field an ICBM. It would, however, jeopardize Kim Jong-il's regime and the North Korean state. Nor would a nuclear Iran pose an existential threat to the United States. Tehran's clerics could, however, judge that a war with the United States could lead to their ouster. Many of America's opponents will thus have a strong motivation to pursue nuclear weapons and escalate conflicts to avoid annihilation.

Technology has also changed the nuclear landscape, blurring traditional distinctions between conventional and nuclear arms. Whereas commentators on the left have for years feared that fielding more discriminate nuclear weapons would "conventionalize" them, in fact conventional arms now approach the effectiveness of nuclear weapons. Soviet military theorists writing in the late 1970s were among the first to observe that precision-guided munitions (PGMs) were being fielded that had effectiveness nearing that of tactical nuclear weapons. Although not all nuclear missions have been displaced by conventional munitions, precision-guided weapons are today capable of destroying a wide range of targets that until recently would have required nuclear weapons. In addition, the deployment of ballistic missile defenses now offers the prospect of defending the United States, our forces, and our allies against missile attack.

I.II Objective of the Effort

With this context in mind, the objective of this effort was to provide a forum for innovative thinking about the role of nuclear weapons in US national security policy and the relationship between nuclear weapons, conventional munitions, and missile defenses. To do so, we examined the potential future utility of nuclear weapons by investigating their possible use, including as deterrents, in the context of specific crisis scenarios. We sought to identify areas of consensus regarding nuclear weapons, or schools of thought where no consensus exists, as well as the assumptions that underlie them. The intent was to inform the ongoing debate surrounding several nuclear weapons policy concerns, including the abolitionist call to zero, the Comprehensive Test-Ban Treaty (CTBT), follow-ons to the New START Treaty, and discussion of nuclear modernization.

Questions To Be Answered

With the aforementioned background and objectives, we sought to answer the following questions:

- Given the potential future security environment, has the utility of nuclear weapons changed and if so, why and how?
- What are the prospects for the further proliferation, rollback, elimination, or cooperative control of nuclear weapons?
- In the context of various possible future security crises, how might nuclear weapons be useful as a deterrent and what contingency plans would make them so?
- Specifically, why, where, when, and how might nuclear weapons be used by the US and others?
- Do US allies require an umbrella of extended deterrence from the US?
- For what missions and under what circumstances might conventional weapons substitute for nuclear weapons?
- For what missions might ballistic missile defense (BMD) substitute for or complement nuclear weapons?
- Under what circumstances might BMD allow for changes in the US nuclear arsenal or cause others to change their arsenals?
- What types of nuclear weapons may be required to carry out various missions?
- What do the above considerations imply for the size and shape of the US nuclear weapons arsenal?
- What sort of research and development (R&D) and testing activities might be required to support this posture?

I.III Method and Process

The method and process used for this effort centered on a series of three workshops drawing upon experts from across JHU, as well as from other academic institutions, national laboratories, think tanks, and the government. The first workshop laid the foundation for thinking about the problem. Participants received briefings on nuclear weapons thinking during the Cold War, changes in the strategic environment since the Cold War period, and nuclear terrorism and its likelihood. Participants were then exposed to two security crisis scenarios and were asked to formulate US objectives, policy and strategy options, and recommendations. During the second workshop, participants were asked to consider three additional scenarios and formulate US objectives, options, and recommendations. During the first two workshops the participants also took surveys focusing on the aforementioned questions. A third workshop considered the results of the first two workshops. During this final workshop, survey results, answers to questions, and participants' thoughts on the future of nuclear weapons provided the stimulus for further discussion.

I.IV Crisis Scenarios

A nuanced examination of the future utility of nuclear weapons requires that they be examined in the context of potential future crisis scenarios. These scenarios are not predictions but rather are meant as heuristics to allow scholars and policy makers to think through the various potential roles of nuclear weapons in a concrete context. Specifically, this project employed five scenarios:

- North Korean Implosion
- China-Taiwan Conflict
- Nuclear-Capable Iran
- Pakistan Collapse
- Terrorist Nuclear Weapon Use in the US

Participants were asked to formulate US objectives in the context of the scenario; develop options the US might consider, identifying pros and cons; and where possible, develop recommendations. These are presented in Appendix 1.

Scenario I – North Korean Implosion

In this scenario, Kim Jong-il dies leaving a clear successor. Various factions within the North Korean (NK) state vie for power. In such an environment, the United States and South Korea agree to attempt to contain North Korea. The urgency of doing so is magnified by reports that elements of the Korean Workers' Party are interested in selling fissile material. To prevent fissile material from leaving NK, the US, South Korea, Japan, and People's Republic of China (PRC) agree to conduct maritime interdiction operations in the waters off North Korea. In response, North Korea's official media warns these "attacking nations" should "stay out." The North Korean military follows this declaration by launching a conventional ballistic missile

attack against South Korea and a nuclear ballistic missile attack against the US base in Kadena, Okinawa, killing 10,000 American and Japanese citizens.

Scenario II – China-Taiwan Conflict

In this scenario, a "double-dip" global recession occurs following the latest global financial crisis. In an effort to avert unrest while continuing to underwrite many of its newly emerging industries, the Chinese government depletes much of its financial reserve. As economic growth decreases, domestic unrest begins to increase. Seeing these developments and concerned that the economic meltdown occurring on the mainland could spread to Taiwan, the government in Taipei decides to, in the words of the government of Taiwan, "go its own way." The Chinese government views such language as tantamount to a declaration of independence by Taiwan. In response, the PRC conducts a naval blockade and launches a large-scale conventional ballistic missile campaign against Taiwan. The United States, in turn, deploys naval and air assets into the region to break the PRC blockade and deter a Chinese invasion of Taiwan. The PRC launches conventional attacks on the intervening US force, causing casualties.

Scenario III – Nuclear-Capable Iran

In this scenario, Iran is credited with the ability to manufacture and deliver nuclear weapons, although Tehran has not conducted a nuclear test. Additionally, Iranian rhetoric continues to threaten Israel. In an attempt to stem Iran's nuclear capability, Israel launches a pre-emptive strike on Iran's fuel-processing facilities, weapons plants, and presumed nuclear storage sites. In response, the Iranian government approves terrorist attacks against Israel and threatens Israel with nuclear attack. Because Tehran views the US as complicit in the Israeli attack, Iranian leaders also threaten US bases in the region with nuclear attack.

Scenario IV – Pakistan Collapse

In this scenario, both the Pakistani Taliban and Al-Qaeda continue their campaign against the government of Pakistan by infiltrating the Pakistani security services and seeking to disrupt the Pakistani leadership. This scenario envisions the Pakistani Taliban assassinating the Pakistani president, prime minister, and several senior military leaders. A power struggle among various Pakistani factions ensues, and the United States receives credible intelligence that a rogue faction of the military sympathetic to the Taliban and Al Qaeda has gained control over a portion of its nuclear arsenal. In response to this intelligence, both the US and India separately deploy Special Operations Forces (SOF) to Pakistan to locate and secure nuclear weapons. Upon learning of the Indian incursion, a faction of the Pakistani military launches a nuclear weapon into a major Indian city, killing 70,000.

Scenario V – Terrorist Nuclear Weapons Use in the US

In this scenario, a faction within the Pakistani armed forces, enraged by US actions, including *Predator* strikes within their country, provides Al Qaeda with an unknown number of nuclear weapons. Al Qaeda then smuggles at least two nuclear weapons into the US aboard private yachts. The first nuclear weapon detonates in the port of Long Beach, CA, killing approximately 50,000. Al Qaeda takes responsibility for the attack and declares that it was the first of many in the *jihad* against the West. A second nuclear weapon is then detonated in the port of Charleston, SC. It is unknown whether more will follow.

I.V SUMMARY AND ANALYSIS

This section seeks to address many of the questions posed at the beginning of this report in the context of the scenarios presented. As noted above, in some scenarios, participants could not agree on a way ahead.

Under what conditions might the US use nuclear weapons?

It became apparent throughout this project that the decision to use nuclear weapons would depend on a range of circumstances, including:

- Whether the US or its allies were attacked and, if so, how;
- Who the President and the President's advisors were;
- Whether at the time of the attack the US was perceived as strong or as weak;
- The nature of US relations with its allies and partners;
- What is required for the US to be seen as a viable and trusted partner; and
- Whether the US wants to be perceived as rational or not.

Participants were willing to contemplate using the US nuclear arsenal to signal US resolve in most, if not all, of the scenarios. Specifically, they were willing to deploy nuclear-capable delivery platforms into a conflict area in a way that adversaries would have been able to observe. However, participants realized that there were circumstances where nuclear posturing and signaling would be less feasible or desirable than others. For example, in scenarios involving less sophisticated states as well as non-state actors, an adversary might not be able to perceive such signals. In other cases, misperception could cause posturing and signaling to have unintended negative consequences. Although designed to show US commitment and de-escalate a conventional crisis, such actions could have the opposite effect and cause escalation.

Most participants believed that the United States would be most likely to use nuclear weapons in retaliation against an adversary's use of nuclear weapons against US forces abroad (as in Scenario I) or against the US homeland (as in Scenario V).

In Scenario I, North Korea launched a nuclear attack against the US base at Kadena, Okinawa. In this case, most participants believed that US nuclear retaliation would send a message to the world that nuclear aggression against the United States would

bring the harshest possible response. They also believed that it would be the most effective way to prevent North Korea from launching nuclear strikes on South Korea, Japan, and the US. Finally, they believed it would demonstrate that the United States was willing to use nuclear weapons in retaliation against a nuclear attack on a US ally, in this case Japan.

Most participants also supported nuclear retaliation when terrorists used nuclear weapons against the US homeland. In this case, there was considerable support for attacking Al Qaeda safe havens in the Federally Administered Tribal Areas (FATA) and North West Frontier Province (NWFP) of Pakistan using nuclear weapons. The primary rationale was twofold. First, most participants felt that such action would send a strong message to the world that there are massive and immediate consequences for attacking the US homeland with nuclear weapons.

Second, some participants believed that given the FATA and NWFP terrain, nuclear weapons would likely have greater military utility than conventional weapons. Others, however, believed that since it couldn't be assumed that Al Qaeda would actually be present in these areas, it was not clear that there would be any military utility to nuclear use.

In other cases, such as a China-Taiwan conflict (Scenario II) and the conflict between Iran and Israel (Scenario III), there was less support for US nuclear use. In these cases, participants felt that nuclear weapons offered no distinct military advantage over conventional weapons. Moreover, they believed the political utility of nuclear weapons would be limited in such cases.

In Scenario II, the China-Taiwan conflict, participants faced a difficult tradeoff involving the credibility of extended deterrence. On the one hand, a US failure to support Taiwan in the face of Chinese aggression would have tremendous international political ramifications and could undermine US credibility worldwide. On the other hand, by defending Taiwan the United States would face the possibility that China could escalate the conflict, perhaps even to the use of nuclear weapons against the continental United States. In general, participants were reluctant to use nuclear weapons in this scenario. However, if the PRC attacked US forces attempting to break its blockade or struck US bases in regions with nuclear weapons, many participants showed a willingness to retaliate with nuclear weapons, especially if US bases were attacked with Chinese nuclear weapons. Even in these circumstances, however, some participants believed that advanced conventional weapons might prove to be credible substitutes for nuclear weapons.

In Scenario III, a nuclear-capable Iran lashed out at Israel and the US. In this scenario, it was unclear to participants whether nuclear weapons would enjoy any distinct advantage over conventional weapons. However, participants were willing to contemplate nuclear use if Iran used nuclear weapons against US forces in the region or if a US political decision was made to eliminate Iran's nuclear infrastructure.

Do US allies require an umbrella of extended deterrence?

Answering this question requires an understanding of why the US extends deterrence and attempts to reassure allies in the first place. Traditionally, the US has offered extended deterrence guarantees to allies to protect them against aggression by neighbors. In a number of cases, the US has used extended deterrence in an effort to prevent allies from acquiring nuclear weapons of their own. In considering whether to extend deterrence, the US must make a basic calculation of national interests that might involve issues such as regional influence, nuclear nonproliferation, or commitment to preventing conventional wars. Allies who are the potential recipients of extended deterrence must, for their part, make calculations of their own national interests leading them to desire and ask for the US guarantee. For extended deterrence to exist, both of the above conditions must exist.

Extended deterrence is, however, situational. In the case of NATO, extended deterrence is institutionalized not only in the NATO Treaty, but also in a host of organizations, doctrine, and procedures. In other cases, such as South Korea and Japan, extended deterrence is less institutionalized. In these cases, it may take additional effort to reassure an ally. For example, Seoul has asked the United States to reaffirm its extended nuclear guarantee. As a result, in an October 2009 speech, US Defense Secretary Gates said:

"North Korea continues to pose a threat to South Korea, to the region, and to others... And as such, I want to reaffirm the unwavering commitment of the United States to the alliance and to the defense of the Republic of Korea (ROK). The United States will continue to provide extended deterrence, using the full range of military capabilities including the nuclear umbrella to ensure ROK security"

Similarly, Japan also requested that the US reaffirm its extended deterrence guarantee in the wake of North Korean nuclear weapons and ballistic missile tests.

Extended deterrence featured directly in several of the scenarios considered in this study. Moreover, considerations of the credibility of US nuclear guarantees figured in deliberations on each of the scenarios. It is worth noting, however, that given the effectiveness of precision-guided weapons, it is increasingly likely that extended deterrence need not be nuclear to be credible.

For what missions and under what circumstances might conventional weapons be substituted for nuclear ones?

There was a consensus that today precision-guided conventional weapons can substitute for nuclear weapons for a growing range of missions. Moreover, participants believed that if it were possible to substitute conventional weapons for nuclear ones, then conventional weapons should be used. Using precision-guided munitions would allow the US to maintain the moral high ground. Others argued that the use of precision-guided munitions would further devalue nuclear weapons.

At the same time, participants acknowledged that nuclear weapons continue to have unique utility. In some instances, nuclear weapons offer a credible deterrent to attacks

against the continental United States or US bases and forces abroad. In addition, nuclear weapons may be useful to signal US resolve. Finally, they may provide the only means to destroy certain types of targets, such as hardened facilities.

For what missions might BMD substitute for nuclear weapons?

Participants felt that there are few missions for which BMD could actually substitute for nuclear weapons mainly because BMD is defensive by nature. Further, given that adversaries could overwhelm existing BMD systems, they are unlikely by themselves to deter an aggressor from launching missile barrages. BMD, however, can complement nuclear weapons because unless an adversary is prepared to launch massive missile barrages, even minimal defenses could affect an adversary's risk calculations when deciding to launch a few missiles. At present, the most advanced US BMD systems are being provided to allies who are under the US nuclear umbrella.

What are the prospects for the further proliferation, rollback, elimination, or cooperative control of nuclear weapons?

Participants generally agreed that abolition of nuclear weapons or disarmament is both extremely unlikely and undesirable. Most participants also believed that the US should not announce a "no first use" policy. Finally, it should be noted that nuclear weapons have served to reduce wartime casualties. Participants feared that the global elimination of nuclear weapons would merely make the world once again safe for large-scale conventional warfare.

Why, where, when, and how might the US use nuclear weapons?

Participants believed that the most plausible scenario for the use of US nuclear weapons was in retaliation against a nuclear strike launched by a state against the US.

There was considerable debate over whether the US should respond with nuclear weapons to a terrorist nuclear strike, in part due to the difficulty of attribution. Participants also debated whether to retaliate with nuclear weapons against a nuclear strike against a US ally. In both cases there were proponents of nuclear retaliation and those who believed that conventional weapons could substitute for nuclear weapons.

Participants showed little sentiment for the US to escalate to nuclear weapons use in the face of a prospective conventional defeat. There was also a visceral distaste by most participants for counter-value targeting, although not necessarily for counter-value threats. At the same time, participants recognized that counter force targets in many countries are often placed in populated areas and that collateral damage will necessarily cause civilian casualties.

A major topic of debate was whether or not the US should retaliate with conventional or nuclear weapons following a nuclear attack on the US. Specifically, participants differed in their answers to the following questions:

- Does a nuclear attack demand a nuclear response?

- Would conventional weapons be effective enough to substitute for nuclear weapons?
- What signal would nuclear versus conventional retaliation send?
- Is it possible to use conventional weapons to restore nuclear deterrence and nuclear non-use?

There were two schools of thought on this topic. One group of participants believed that a nuclear attack on the United States or a close ally would demand a nuclear response. They believed that nuclear retaliation would be necessary to restore deterrence. They also believed that only nuclear weapons might be effective enough to do the job. Finally, they felt that the American people would demand nuclear retaliation in the wake of a nuclear attack on the United States.

A second school of thought held that the US should retaliate against a nuclear attack on the United States or a close ally with conventional weapons. The rationale, which assumes that conventional weapons are effective enough for a punitive response or even regime change, as demonstrated by the wars in Afghanistan and Iraq, was that refraining from using nuclear weapons would help to further delegitimize nuclear weapons. Additionally, relying on conventional weapons to retaliate would also allow the US to maintain the moral high ground.

Participants deemed it important to penalize states that use nuclear weapons, or supply nuclear weapons or fissile materials to others who in turn use them against the US. However, there was considerable discussion over whether in these circumstances it would be more credible to retaliate with nuclear weapons or to threaten to overthrow the offending regime. Participants believed that leaders facing such a decision would need to judge whether, for example, to use nuclear weapons without knowing where all of an adversary's nuclear weapons were, or whether the US would engage in regime change if it could not be sure that it could swiftly disarm the state in question.

The threat to overthrow regimes that use nuclear weapons or supply nuclear weapons or fissile materials to others who might use them should be a powerful deterrent. For example, some believe that Libyan leader Muammar al-Gaddafi gave up his nuclear weapons development program after watching regime change take place in Iraq. On the other hand, the threat of regime change could promote nuclear proliferation as some nations see possession of nuclear weapons as the only defense against regime change.

What do the above considerations imply for the size and shape of the US nuclear arsenal?

Although participants believed that the elimination of all nuclear weapons was neither feasible nor desirable, they believed that it is feasible to reduce nuclear arsenals. Participants were uncertain how low the number of US strategic nuclear warheads should go, but did agree that the number was almost certainly less than 1,000 strategic warheads. This number was based in part on the recognized survivability of US submarine launched ballistic missiles (SLBMs), which could ensure a second strike capability. Participants believed, however, that the US should not reduce its arsenal

to an unstable level, that is, an arsenal so small and vulnerable that could invite a decapitating first strike by a potential adversary.

Many participants believed that the type and quality of nuclear weapons and delivery systems was more important than the number of weapons in the US nuclear arsenal. Specifically, participants saw a need for a rapidly delivered nuclear weapon with a variable yield, a weapon that could achieve military effects and political objectives without causing extensive collateral damage. For example, the US B-61 nuclear bomb, currently in the US arsenal, has a yield ranging from 0.3 to 360 kilotons. Nuclear cruise missiles also have variable yields.⁴

I.VI Issues for Further Research

Participants believed that two main areas require further investigation:

1. Against what types of targets can conventional weapons substitute for nuclear weapons from a lethality perspective? The issue here is that there may be times when a conventional strike is appropriate and it would be desirable to forgo the use of a nuclear weapons; and
2. What would constitute a sufficiently punitive response to nuclear use, and by extension, what should be threatened to deter nuclear use? This subject was discussed at length with some participants believing that a nuclear strike on the US must be met with a retaliatory nuclear strike and those who believed that conventional retaliation was sufficient.

I.VII Conclusions and Final Thoughts

Participants agreed that nuclear weapons continue to have political and military utility specifically as a deterrent and as a retaliatory weapon against those who would use nuclear weapons against the US. However, the relative utility of nuclear weapons has decreased for the US given its conventional weapons superiority. As shown by recent history the US does not need to resort to nuclear weapons to carry out many of its military objectives given its overwhelming conventional military superiority.

At the same time, given US conventional military superiority, the utility of nuclear weapons has now increased for many potential adversaries. They see nuclear weapons as an equalizer to US conventional superiority and a way to prevent what they see as unwanted US aggression or even regime change. The key to diffusing future confrontations is to view the world from the position of potential adversaries. Attempts must be made to understand their history; the way in which they view the world; their motivations, intentions, and priorities; and the drivers and constraints underlying their domestic and foreign policies. Only then can the US understand the potential impact of its policy options on others.

⁴Robert S. Norris and Hans M. Kristensen, "US Nuclear Warheads, 1945–2009," *Bulletin of Atomic Scientists*, Jul/Aug 2009, p 78

In examining the various scenarios in this study, the prospect of nuclear escalation was always foremost in participants' thinking and such considerations are as likely to influence US military options in future conflicts. That is, if the US chooses to use nuclear weapons on a nuclear-capable adversary, it needs to understand the risks to its own population and to its place in the world.

II. APPENDIX 1: Conflict Scenarios, US Objectives, Options for Achieving Objectives, Pros and Cons to Options, and Recommendations

Scenario I – North Korean Implosion

In this scenario, Kim Jong-il dies leaving a clear successor. Various factions within the North Korean (NK) state vie for power. In such an environment, the United States and South Korea agree to attempt to contain North Korea. The urgency of doing so is magnified by reports that elements of the Korean Workers' Party are interested in selling fissile material. To prevent fissile material from leaving NK, the US, South Korea, Japan, and People's Republic of China (PRC) agree to conduct maritime interdiction operations in the waters off North Korea. In response, North Korea's official media warns these "attacking nations" should "stay out." The North Korean military follows this declaration by launching a conventional ballistic missile attack against South Korea and a nuclear ballistic missile attack against the US base in Kadena, Okinawa, killing 10,000 American and Japanese citizens.

US Objectives

Participants believed that the immediate US objective in the wake of the North Korean missile attacks would be to stop any future attacks on US allies, US bases in the region, or US territory. Over the longer term, NK would need to relinquish its nuclear weapons. Study participants agreed that it would be acceptable for the PRC to secure NK nuclear weapons. It was also agreed that key alliances in the region (US–South Korea and US–Japan) would need to be maintained, that the preservation of the Nuclear Non-Proliferation Regime was tantamount, and that a return to nuclear deterrence was required.

Options for Achieving Objectives

Participants developed and explored five potential responses to a North Korean nuclear attack on Kadena:

Option 1. The US could **demarche** the North Korean government, threatening it with severe consequences if P'yongyang were to launch further attacks. Considerations associated with such an approach include:

- The demarche, which some participants considered tantamount to appeasement, could not be guaranteed to work and might not prevent further NK attacks;
- Ballistic Missile Defense (BMD) used in conjunction with the demarche might not deter and/or protect against further missile attacks;
- The US would not be forced to use nuclear weapons;
- A diplomatic demarche might be insufficient to assuage US allies' fears; and
- Other nations around the world, especially US allies, might see the US as weak and decide that Washington cannot be counted on in a future crisis.

Option 2. The US could launch **limited conventional weapons strikes** on NK missile launch sites. The considerations associated with such an approach include all of those listed above under Option 1, plus the additional possibility that, if unsuccessful, such US strikes might prompt more strikes by NK.

Option 3. The US could launch **large-scale conventional weapons strikes** on NK launch sites and weapons infrastructure, as well as deploy BMD to Japan and South Korea. Such an approach would be intended to send a message to the world that using nuclear weapons carries with it the risk of retaliation. It is unclear, however, whether this approach would be sufficient to convince allies that the US can be counted on as a reliable partner, at least to the extent that they equate extended deterrence with extended *nuclear* deterrence.

Option 4. The US could launch **limited nuclear strikes** on NK weapons as well as deploy BMD to Japan and South Korea. This action would be likely to diminish NK's ability to continue to launch strikes on South Korea, Japan, and the US. Additionally, it would send a strong message that using nuclear weapons would carry with it dire consequences. Additionally, as long as the US nuclear strikes eliminate NK's ability to launch further strikes, US action is likely to assuage US allies' fears. This option would, of course, require the US to cross the nuclear threshold.

Option 5. The US could launch **massive nuclear weapons and conventional strikes** on NK nuclear weapons infrastructure in an effort to overthrow the North Korean government, plus deploy BMD to protect South Korea and Japan. The considerations associated with this option are those in the previous option, except that in this option the US would play a major role in stabilizing and reconstructing the north. Additionally, this option would require close cooperation with China as instability on the NK–Chinese border is likely to occur.

Recommendation: The group was split between Options 3 (large-scale conventional strikes) and 4 (limited nuclear strikes). Both favored the deployment of BMD to protect US allies and forces.

There was considerable debate over whether the US should employ nuclear retaliation in response to a nuclear attack. Some believed that credibility demanded that the US demonstrate its willingness to retaliate with nuclear weapons when nuclear weapons were used against it, its bases, or its allies. In their view, the US needed to respond to a NK nuclear strike with nuclear weapons to restore deterrence, assuage allies' desire

to see the US as a viable security partner, and ensure the destruction of NK nuclear weapons capabilities. Others were not so sanguine, believing that US conventional weapons could achieve the same level of efficacy as nuclear weapons without crossing the nuclear threshold, therefore helping to maintain the NNPR.

From the group's discussions, it was clear that:

- Some level of diplomacy, especially in dealing with the Chinese and allies, would be important
- BMD's defensive and deterrent role would cause NK to reevaluate the efficacy of any future missile attacks
- Most importantly, there was an overwhelming need to eliminate North Korea's nuclear weapons once P'yongyang had demonstrated its willingness to use them.

Scenario II—China-Taiwan Conflict

In this scenario, a "double-dip" global recession occurs following the latest global financial crisis. In an effort to avert unrest while continuing to underwrite many of its newly emerging industries, the Chinese government depletes much of its financial reserve. As economic growth decreases, domestic unrest begins to increase. Seeing these developments and concerned that the economic meltdown occurring on the mainland could spread to Taiwan, the government in Taipei decides to, in the words of the government of Taiwan, "go its own way." The Chinese government views such language as tantamount to a declaration of independence by Taiwan. In response, the PRC conducts a naval blockade and launches a large-scale conventional ballistic missile campaign against Taiwan. The United States, in turn, deploys naval and air assets into the region to break the PRC blockade and deter a Chinese invasion of Taiwan. The PRC launches conventional attacks on the intervening US force, causing casualties.

US Objectives

Participants believed that the overarching objective in this scenario would be a return to the *status quo ante bellum*, including Taiwan as a separate, yet not legally independent, entity. It would also include restoring US and PRC relations and trade. Finally, it would include signaling to the world that aggression is unacceptable. Participants also acknowledged, however, that restoring the *status quo* once hostilities broke out would be exceedingly difficult. They also recognized that there would be asymmetries in interest between the two sides: whereas Beijing sees Taiwan as a core interest, Washington sees it as of secondary importance. Trying, and failing, to bring Taiwan to heel could destroy the legitimacy of the regime in Beijing; by contrast, Taiwan being subsumed by the PRC would not pose an existential threat to the US.

Options for Achieving Objectives

Participants developed and explored five potential responses to a China-Taiwan conflict:

Option 1. The US could **make diplomatic statements** consistent with its Taiwan Relations Act. Exercise of this option would start the process of sending a message that the US cares about Taiwan and has not abrogated its commitments to the island. However, participants agreed that such action would not go far enough and would likely be perceived as weak by the PRC, Taiwan, and others who rely on the US for their security.

Option 2. The US could **provide BMD to Taiwan**. Although participants deemed this option necessary, they also considered it insufficient and believed that it would have to be combined with other options to achieve US objectives. Participants were also unclear about the effectiveness of US BMD in the face of massive and unrelenting Chinese missile barrages.

Option 3. The US could conduct **conventional and proportional attacks against PRC naval and air assets enforcing the blockade** and provide **BMD to Taiwan**. This option would provide a concrete demonstration of US resolve and commitment to Taiwan. It would also be combined with the diplomatic statements of Option 1.

Participants believed that this option had a number of attractive features. In particular, it would reinforce US alliances, be proportional in terms of its response, and would attempt to control escalation. As in all wars, however, the “fog of war,” miscalculation, and mistakes on both sides could lead to unintended consequences and pressures for escalation. In addition, participants felt that the US would likely have to strike the PRC mainland to suppress Chinese ballistic missiles. Finally, the US could expend a tremendous amount of blood and treasure in this scenario.

Option 4. The US could **immediately conduct conventional strikes on the PRC mainland** to take out assets attacking Taiwan, the US, and allies. This option could suppress Chinese missile launches. It would also send a very strong message to the PRC regarding the US commitment to Taiwan. Many US allies would likely take note and be reassured of US will and commitment. However, as with the previous option, there would be an exceedingly high risk of escalation. Given the asymmetry of interest between China and the United States, Beijing might be willing to escalate beyond the US pain threshold. It would also likely forgo any possible return to the *status quo ante bellum*. In short, this option provides for conflict escalation from the start. Although attacks on the PRC mainland may be necessary at some juncture, participants were not inclined to escalate to this level at the outset.

Option 5. The US could immediately launch **nuclear attacks on the PRC mainland**. This option *would* provide the greatest chance to destroy Chinese missile launchers. It would also send a very strong message to the PRC regarding the US commitment to Taiwan. US allies would likely be assured of US will and commitment; others, however, might view such a move as an overreaction. However, given the imbalance of interest between Washington and Beijing, there would be an exceedingly high risk of escalation. As with some other options, this one forgoes any hope of return to the *status quo ante bellum*.

In summary, although attacks on the PRC mainland might be necessary at some juncture and nuclear attacks might prove militarily effective, participants were not inclined to escalate to this level at the outset unless China attacked the US or its forces with nuclear weapons.

Recommendation: Participants were inclined to choose a combination of Options 1, 2, and 3 (diplomatic statements, BMD, and conventional attacks on PRC assets enforcing a blockade). Their intent was to come to Taiwan's aid and send a message to Taiwan and other allies around the world that the US was a reliable ally, while also trying to avoid attacks on the Chinese mainland and the use of nuclear weapons. However, participants believed that attacks on the PRC mainland, including nuclear strikes, might be warranted if the PRC attacked US forces or bases in the region with nuclear weapons or appeared to be preparing to do so.

Scenario III—Nuclear-Capable Iran

In this scenario, Iran is credited with the ability to manufacture and deliver nuclear weapons, although Tehran has not conducted a nuclear test. Additionally, Iranian rhetoric continues to threaten Israel. In an attempt to stem Iran's nuclear capability, Israel launches a pre-emptive conventional strike on Iran's fuel-processing facilities, weapons plants, and presumed nuclear storage sites. In response, the Iranian government approves terrorist attacks against Israel and threatens Israel with nuclear attack. Because Tehran views the US as complicit in the Israeli attack, Iranian leaders also threaten US bases in the region with nuclear attack.

US Objectives

Participants believed that US objectives in such a scenario would be both short and long term. In the short term, the United States would seek an immediate ceasefire. It would also seek to prevent the escalation of the conflict between Iran and Israel. Additionally, the US would wish to protect its friends in the region. Over the long term, participants believed that the United States would seek a stable Middle East free of nuclear weapons.

Options for Achieving Objectives

Participants developed and explored three potential responses to the conflict:

Option 1. The US could seek a diplomatic solution to the conflict. This would include trying to create a dialogue among the various parties involved, likely through intermediaries. Although participants were unsure whether this option would be successful by itself, they felt it would be required to some degree regardless of any other option(s) chosen.

Option 2. The US could undertake **limited military operations** against Iran. In particular, participants explored three suboptions. The particular suboption to be chosen would depend on what Iran actually does and what attacks it initiates.

Option 2a. If *Iran does not attack US bases* in the region, the **US could use its forces to posture or signal**. This would likely involve the movement of conventional forces, including carrier strike groups as well as other US expeditionary forces, into the region. The US would also likely deploy BMD to protect US bases and allies. The US might also deploy nuclear weapons-capable delivery platforms into the region. Such actions would be meant to reassure regional allies that the US is committed to defending them and is attempting to restrain Iran. They would also send a message to US allies around the world that they could count on the US. Of course, Israel's nuclear arsenal is likely to be a significant factor in this scenario as well.

Option 2b. If *Iran attacks Israel*, **Israel would respond vigorously** with either conventional or nuclear weapons depending on the scope of Iranian attacks, weapons used against it, and the level of damage and casualties it sustained. The US would still likely pursue Options 1 and 2a and attempt to restrain the combatants.

Option 2c. If *Iran attacks US bases* in the region, the **US would retaliate in kind** using conventional weapons or low-yield nuclear weapons against military targets. Targeting and the weapon to be used would depend on the types of weapons used by Iran and the level of damage the US and its allies sustained.

Option 3. The US could seek to **overthrow the Iranian regime**. Participants believed that the use of US nuclear weapons would not be necessary in this scenario. However, nuclear use to eliminate Iran's nuclear weapons might be attractive in order to decrease US costs. Some participants were reluctant to support the use of US nuclear weapons unless Iran attacked the United States with nuclear weapons; others believed the United States should use them to avoid great losses.

Recommendation: Participants failed to achieve a consensus option for this scenario. Rather, the chosen plan of action always included Option 1 (diplomatic), but the decision to pursue either Option 2 (posturing/use of force) or Option 3 (regime change) would depend on Iran's actions. In all cases however, participants saw the posturing of both US conventional and nuclear forces as desirable in order to send a message to both the Iranians and US allies. Additionally, potential use of US nuclear weapons would depend upon:

- The level of damage and casualties suffered by the US;
- A calculation of the military efficacy of nuclear weapons versus conventional weapons;
- A calculation of potential casualty avoidance through the use of nuclear weapons; and
- And the implications for the nuclear regime.

Scenario IV–Pakistan Collapse

In this scenario, both the Pakistani Taliban and Al-Qaeda continue their campaign against the government of Pakistan by infiltrating the Pakistani security services and seeking to disrupt the Pakistani leadership. This scenario envisions the Pakistani Taliban assassinating the Pakistani president, prime minister, and several senior military leaders. A power struggle among various Pakistani factions ensues, and the United States receives credible intelligence that a rogue faction of the military sympathetic to the Taliban and Al Qaeda has gained control over a portion of its nuclear arsenal. In response to this intelligence, both the US and India separately deploy Special Operations Forces (SOF) to Pakistan to locate and secure nuclear weapons. Upon learning of the Indian incursion, a faction of the Pakistani military launches a nuclear weapon into a major Indian city, killing 70,000.

US Objectives

As in previous scenarios, participants believed that the US would have both short- and long-term objectives. In the short term, the US would seek to control escalation and attempt to convince India to not counter-attack using nuclear weapons. Additionally, the US would want to assist responsible elements of the Pakistani government in securing loose nuclear weapons. The US would also seek to prevent attacks against US forces in the region, particularly Afghanistan. In the longer term, the US would seek the nuclear disarmament of Pakistan since it would have proven it could not maintain positive control of its nuclear weapons.

Options for Achieving Objectives

Participants developed and explored five potential responses to this scenario:

Option 1. In this option the US would attempt to reassure India that the US is working with Pakistan to regain control over its loose nuclear weapons and fissile material while seeking to **influence India not to go to war with Pakistan**. At issue, however, is the understanding that India will be under intense domestic political pressure to retaliate with nuclear weapons against Pakistan. Participants recognized that US influence over India in this scenario would likely be negligible given the massive casualties it has suffered.

Option 2. The US could step back and **let war occur between India and Pakistan**. This would yield tremendous damage, numerous deaths and casualties, and a humanitarian crisis on both sides. Participants believed that perceptions of such a conflict would influence how others viewed the utility of nuclear weapons in the future. If nuclear use resulted in relatively few casualties, and if one side or the other were perceived as being victorious at the end of the war, observers might conclude that nuclear weapons had been both politically and militarily useful. If, on the other hand, a nuclear conflict between India and Pakistan caused widespread devastation without yielding a decisive result, nuclear weapons would be delegitimized.

Option 3. The US could **deploy nuclear-capable systems to the region** to attempt to deter the rogue Pakistani faction from using nuclear weapons against US forces in the region. Participants believed that even if such a move were successful, it would be unlikely to deter strikes by Pakistan against India.

Option 4. The US could **use nuclear weapons to destroy the stolen Pakistani nuclear weapons** in the North West Frontier Province (NWFP) and/or the Federally Administered Tribal Area (FATA). Although most participants did not support this option, some argued that nuclear weapons would be the only militarily effective means to destroy the loose nukes. They noted that the NWFP and FATA are relatively barren territories so little collateral damage would occur. They also argued that the use of nuclear weapons would have severe consequences.

Other participants countered that by striking with nuclear weapons, the US would be demonstrating their utility and might spur others to seek them. Additionally, some participants noted that there would be a moral price to be paid for US use of nuclear weapons given that the strongest world power used nuclear weapons against one of the poorest.

Option 5. The US could **use conventional forces, including SOF, to locate, secure, and destroy loose Pakistani nuclear weapons**. Participants discussed a number of approaches to this mission including the use of conventionally armed submarine launched ballistic missiles (SLBMs) to eliminate loose nuclear weapons, or sharing information with India to allow it to secure the weapons. However, participants acknowledged that reliable information on the status and location of the nuclear weapons would likely be the most important, and most difficult, factor in achieving success in this scenario. To be successful, the US would need reliable intelligence, surveillance, and reconnaissance capabilities that could locate and identify either an imminent launch of a nuclear tipped missile by a breakaway faction, or a possible hand-off of a nuclear weapon to a terrorist group. Participants also acknowledged that the objective of denuclearizing Pakistan would be extraordinarily difficult to achieve.

Recommendation: Participants came to no real consensus on how to proceed in this scenario due to its complexity and the potential risks associated with all the options presented.

Scenario V—Terrorist Nuclear Weapons Use in the US

In this scenario, a faction within the Pakistani armed forces, enraged by US actions, including *Predator* strikes within their country, provides Al Qaeda with an unknown number of nuclear weapons. Al Qaeda then smuggles at least two nuclear weapons into the US aboard private yachts. The first nuclear weapon detonates in the port of Long Beach, CA, killing approximately 50,000. Al Qaeda takes responsibility for the attack and declares that it was the first of many in the *jihad* against the West. A second nuclear weapon is then detonated in the port of Charleston, SC. It is unknown whether more will follow.

US Objectives

Participants believed that short-term US objectives in this scenario would include preventing further nuclear weapons from detonating in the US, reassuring the US public, decapitating the Al Qaeda leadership, and locating and securing any remaining nuclear weapons in Pakistan or elsewhere around the world. In the longer term, the US would seek the nuclear disarmament of Pakistan since it would have proven it could not maintain positive control of its nuclear weapons.

Options for Achieving Objectives

Participants developed and explored six potential responses to this scenario:

Option 1. This option requires that the US **close all US ports and seal off all US borders** for a short period of time. Although this might reassure the US public that something is being done, it could be too late to prevent terrorists from infiltrating additional nuclear weapons into the US. Closing the borders would also have a severe economic impact on the economy.

Option 2. The US could launch a **conventional strike on Al Qaeda safe havens in Pakistan's FATA and NWFP**. Although this option might demonstrate US resolve, it might also be perceived as a weak response to a nuclear attack on US territory. Since the Pakistan government does not control the FATA and NWFP, terrorist safe-havens could be bombed with relative impunity. However, participants questioned whether conventional weapons could be effective absent exquisite intelligence.

Option 3. The US could launch a **nuclear strike on Al Qaeda safe havens in the FATA and NWFP**. Such an approach would demonstrate that there are massive and immediate consequences for attacking the US with nuclear weapons. Nuclear weapons might have greater military effectiveness than conventional munitions in this scenario. A good deal of support existed among the participants for this option. However, some participants argued that American nuclear use could weaken the norm against nuclear use. Others responded that Pakistan's inability to maintain control of its nuclear weapons, which brought on the conflict, could serve to spur disarmament efforts.

Option 4. The US could issue an **ultimatum to Pakistan directing it to locate and secure all loose nuclear weapons and turn over guilty parties**. To coerce the Pakistani government, the US could threaten to strike targets beyond the Al Qaeda safe havens in the FATA and NWFP if Islamabad failed to comply. This effort would likely reassure the US public and allies and would send a message that Pakistan would pay a price for its negligence. Moreover, given the large number of casualties the United States had already sustained, political sensitivities against direct US military activity in Pakistan would likely be gone. However, participants believed that US strikes could lead to a substantial number of innocent Pakistani casualties. Equally important, participants felt it would be immoral to punish Pakistan as a whole for the actions of a small group.

Option 5. The US could **invoke Article V of the NATO Charter and extract all nuclear weapons from Pakistan**. By declaring the attack on the US as an attack on all of

NATO, all NATO members would be called upon to cooperate in the response. Such action would provide multinational political cover to denuclearize Pakistan. However, participants had difficulty envisioning exactly how the denuclearization would be carried out. Carrying out this option would also send a message to other nuclear rogue nations that the same could happen to them. However, some participants argued that the forced denuclearization of Pakistan would be perceived as being pro-Indian, anti-Muslim, and potentially de-stabilizing for the subcontinent as India would retain its nuclear capability.

Option 6. The US could **appease Al Qaeda**. A few participants favored the US agreeing to Al Qaeda's general demands for the US to leave the Middle East as well as cease its support of Israel and what Al Qaeda considers apostate regimes including Saudi Arabia and Egypt. At issue is whether meeting Al Qaeda demands would actually prevent more nuclear weapons from entering or being detonated in the US.

Recommendation: There was no real agreement among the participants on how to proceed in this scenario due to its complexity and the potential risks associated with the options presented.

