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Key Points

- ◆ A Conventional Prompt Global Strike (CPGS) capability would be a valuable strategic asset for some fleeting, denied, and difficult-to-reach targets. It would fill a gap in U.S. conventional strike capability in some plausible high-risk scenarios, contribute to a more versatile and credible U.S. strategic posture, and potentially enhance deterrence across a diverse spectrum of threats.
- ◆ A small number of CPGS systems would not significantly affect the size of the U.S. deployed nuclear arsenal or substitute for the ability of nuclear weapons to hold large sets of hard, deeply buried, or mobile targets at risk.
- ◆ A key concern is the risk that either Russia or China might launch its nuclear forces due to uncertainty about the target of an ambiguous U.S. CPGS strike. Assuming functioning early warning systems, the Conventional Trident Modification (CTM) mitigates this risk better than the conventional strike missile because Russian and Chinese officials would be better able to assess quickly whether a CTM would land on their territory.

Conventional Prompt Global Strike: Strategic Asset or Unusable Liability?

by M. Elaine Bunn and Vincent A. Manzo

The Conventional Prompt Global Strike (CPGS) concept calls for a U.S. capability to deliver conventional strikes anywhere in the world in approximately an hour. The logic of the CPGS concept is straightforward. The United States has global security commitments to deter and respond to a diverse spectrum of threats, ranging from terrorist organizations to near-peer competitors. The United States might need to strike a time-sensitive target protected by formidable air defenses or located deep inside enemy territory. Small, high-value targets might pop up without warning in remote or sensitive areas, potentially precluding the United States from responding to the situation by employing other conventional weapons systems, deploying Special Operations Forces (SOF), or relying on the host country.

A long-range nuclear-armed ballistic missile has the speed and global reach to overcome these obstacles. But a President would probably prefer a conventional strike option as an alternative to nuclear weapons in most contingencies. In fact, many advocates of the CPGS concept argue that it would provide a new capability for scenarios in which existing conventional systems would be insufficient but the use of nuclear weapons would be inappropriate. Additionally, in many potential crises, a nuclear threat might lack credibility in the eyes of U.S. allies and adversaries regardless of a U.S. President's willingness to employ nuclear force. At the same time, U.S. allies and potential adversaries might question whether existing U.S. conventional weapons would be effective against some emerging threats. A long-range conventional strike capability might enhance deterrence and assurance by providing an effective and usable (and thus more credible) strike option. For these reasons, a conventional weapon that is faster, travels farther, and is more effective against

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antiaccess capabilities than existing conventional forces would be a valuable strategic asset.

The most commonly discussed CPGS systems envision mating a conventional warhead with either a submarine-launched ballistic missile (SLBM) or a modified intercontinental ballistic missile (ICBM). If successful, this would provide a conventional weapon with the same rapid speed, global reach, and ability to penetrate air defenses as U.S. nuclear-armed SLBMs and ICBMs.

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Because the United States has thus far only deployed nuclear-armed ICBMs and SLBMs, some argue that U.S. conventional SLBMs or ICBMs would be destabilizing weapons. For instance, Congress withheld the funding necessary for the George W. Bush administration to develop and deploy conventional Trident D-5 missiles on *Ohio*-class submarines due to concerns that Russian officials might misinterpret a U.S. CPGS launch as a nuclear attack. Additionally, since long-range ballistic missiles possess unparalleled speed and reach, some analysts worry that U.S. leaders will be tempted to launch CPGS missiles quickly without fully assessing the potential risks of using military force. Finally, Russian and Chinese officials have suggested that they perceive the CPGS concept as part of a U.S. effort to achieve a first strike capability.

Skeptics also argue that CPGS weapons would likely be unusable because the United States would lack the necessary intelligence to employ them against fleeting targets. If the United States does possess actionable

intelligence, they reason, other conventional assets will be within range of the target.

As a result, there is no clear consensus within Congress and the U.S. national security policy community about whether the United States should develop and deploy CPGS capabilities. This Strategic Forum examines the conceptual and policy issues surrounding CPGS missiles. It concludes that, on balance, a CPGS capability would be a valuable strategic asset for some fleeting and difficult-to-reach targets. It would fill a gap in the U.S. conventional strike capability in some circumstances, contribute to a more versatile and credible U.S. strategic posture, and potentially enhance deterrence across a diverse spectrum of threats.

Continuity amid Change

Reducing the role of nuclear weapons in U.S. national security strategy and enhancing nonnuclear capabilities have been U.S. objectives since the 1994 Nuclear Posture Review.¹ This section examines the previous and current administrations' interest in developing nonnuclear capabilities, especially CPGS. This discussion is intended neither as a comprehensive analysis comparing the Barack Obama administration's nuclear policies to those of the Bush administration nor as a complete assessment of U.S. strategic forces policy since the end of the Cold War. However, this brief review highlights continued U.S. interest in the CPGS concept as an important continuity between the Bush and Obama administrations.

Nonnuclear Capabilities and Tailored Deterrence. President Obama set two objectives for the 2010 Nuclear Posture Review (NPR). He instructed his administration to reduce the role of nuclear weapons in U.S. national security strategy while simultaneously strengthening deterrence of potential adversaries and assurance of U.S. allies and friends.² These objectives also guided the 2010 Quadrennial Defense Review (QDR) and the 2010 Ballistic Missile Defense Review (BMDR).

A core conclusion of these three strategy and policy reviews is that strengthening U.S. reliance on nonnuclear

strategic capabilities to deter adversaries and reassure allies will advance the President's dual objectives. In particular, the 2010 NPR states that improved conventional capabilities have reduced the role of nuclear weapons in deterring and responding to nonnuclear—conventional, biological, and chemical—attacks. Enhancing deterrence of nonnuclear weapons of mass destruction (WMD) and conventional attacks via further improvements in U.S. conventional capabilities is an important policy goal of the 2010 NPR.³ The NPR states that “reinforcing” regional security architectures with nonnuclear capabilities will contribute to the assurance of allies about U.S. security commitments. It further notes that “U.S. nuclear weapons will play a role in the deterrence of regional states so long as those states have nuclear weapons, but the decisions taken in the NPR, BMDR, and QDR reflect the U.S. desire to increase reliance on non-nuclear means to accomplish our objectives of deterring such states and reassuring our allies and partners.”⁴

Administration statements suggest that regional ballistic missile defense architectures and an enhanced mix of nonnuclear strike forces are critical components of its plan to accomplish these objectives. In February 2010, Vice President Joseph Biden said, “Capabilities like an adaptive missile defense shield, conventional warheads with worldwide reach, and others that we are developing enable us to reduce the role of nuclear weapons.”⁵ Similarly, the *NPR Report* states that the administration's near-term goal is to “increase reliance on non-nuclear deterrence capabilities (e.g., missile defense and conventional long-range missiles).” It also notes that the United States protected these systems in New START because of their potential value for regional deterrence: “Contributions by non-nuclear systems to U.S. regional deterrence and assurance goals will be preserved by avoiding limitations on missile defense in New START and ensuring that New START will not preclude options for using heavy bombers or long-range missile systems in conventional roles.”⁶ The BMDR report states that “the role of nuclear weapons in these regional deterrence architectures can be

reduced by increasing the role of missile defense and other capabilities.”⁷

Developing nonnuclear strategic capabilities to reduce the role of nuclear weapons is an important continuity between the Obama and Bush administrations. The Bush administration's 2001 NPR conceptualized strategic capabilities as a New Triad of nuclear and nonnuclear offensive strike forces, defenses (including missile defenses), and a robust industrial base.⁸ “The goal of the new triad is to reduce our emphasis on nuclear weapons for deterrence and provide the president more non-nuclear deterrence options and responses to potential crises,” said Secretary of Defense Robert Gates in 2006.⁹ Similarly, Keith Payne, the Deputy Assistant Secretary of Defense for Forces Policy during the 2001 NPR, explained that the policy guidance flowing from the review “seeks to reduce reliance on nuclear weapons, and place greater weight on non-nuclear threat options.”¹⁰ Brian Green, the former Deputy Assistant Secretary of Defense for Strategic Capabilities, said that “the New Triad is intended to reduce our dependence on nuclear weapons.”¹¹

This continuity between the Bush and Obama administrations stems from a shared assessment of the contemporary strategic environment. The Bush administration's 2001 NPR and 2006 QDR concluded that the world was more complicated and unpredictable than it had been during the Cold War and that the United States had to deter a more diverse range of actors and threats. The policy implication was that the United States needed versatile strategic force structure options from which it could tailor deterrence to specific actors and circumstances. Former Assistant Secretary of Defense for International Security Policy Peter C.W. Flory's explanation of this reasoning is worth quoting at length:

In this new and uncertain environment, a “one size fits all” approach to deterrence is no longer appropriate; we must re-think our approach to 21st Century threats and tailor deterrence to assure our allies and friends, and achieve specific effects

*against a wide array of potential adversaries and circumstances, such as advanced military competitors, regional WMD states, and non-state terrorist networks. To do this we must have a broad range of credible strategic capabilities—including nuclear and non-nuclear Global Strike capabilities, defenses, and a revitalized . . . infrastructure.*¹²

The Obama administration's 2010 *QDR Report* echoes this theme. It states that the United States faces a complex and rapidly evolving security landscape: "The rise of new powers, the growing influence of non-state actors, the spread of weapons of mass destruction and other destructive enabling technologies . . . pose profound challenges to the international order."¹³ The report concludes that the United States needs to create "tailored regional deterrence architectures" with its allies to manage this environment. Accomplishing this will require an in-depth knowledge of the capabilities, intent, values, and decisionmaking of potential adversaries and a diverse

influencing the perceptions of potential adversaries requires tailoring U.S. statements and actions

strategic posture that spans "forward presence, relevant conventional capabilities (including missile defenses), and continued commitment to extend our nuclear deterrent."¹⁴ Vice Admiral P. Stephen Stanley emphasized that effective tailored regional deterrence architectures must combine all of these capabilities.¹⁵

An important takeaway from these quotes is that both administrations emphasized that a mix of nuclear and nonnuclear and offensive and defensive capabilities is necessary for effective deterrence across the contemporary spectrum of threats and actors.

Implementing tailored deterrence requires much more than military capabilities and knowledge of po-

tential adversaries. Influencing the perceptions—and ultimately the actions—of potential adversaries also requires tailoring U.S. statements and actions. The clarity and credibility of American messages in the mind of the deterree are critical to tailoring deterrence threats. Nevertheless, capabilities and knowledge of potential adversaries are also essential ingredients of tailored deterrence, and much work remains in both areas.¹⁶

The Capability Gap and CPGS. Building the proper strategic force posture for tailored deterrence is tricky. Nearly any weapons system could be justified on the grounds that it enhances the versatility of U.S. strategic forces. The challenge is to distinguish between what is necessary for versatility and what is extraneous or even counterproductive and dangerous.

This question is the key dynamic in the CPGS debate. Both the Bush and Obama administrations have noted that the United States cannot currently deliver rapid conventional military strikes on a global scale. In 2006, then-U.S. Strategic Command (USSTRATCOM) commander General James Cartwright explained that the U.S. conventional global strike portfolio includes sea- and air-launched cruise missiles, joint direct attack munitions, and converted cruise missile submarines that carry both cruise missiles and SOF. These assets provide a robust and effective conventional global strike capability.

However, General Cartwright cautioned that a small class of targets exists against which these assets would be ineffective but nuclear weapons would be inappropriate.¹⁷ For example, existing conventional weapons might be too slow to reach time-sensitive targets that spring up without warning in remote locations. This was a key finding of the 2006 *QDR*: "Existing conventional forces, such as fighter and bomber aircraft and surface ships, could take hours to days to deploy and strike a target . . . only nuclear weapons are available 24 hours a day, seven days a week, to engage distant, fleeting targets promptly."¹⁸

Bombers, aircraft, and surface ships carrying cruise missiles might be unable to get within striking distance of a target due to an adversary's antiaccess capabilities. The 2010 *QDR Report* concludes that the threat from

antiaccess capabilities is growing: “States with the means to do so are acquiring a wide range of sophisticated weapons and supporting capabilities that, in combination, can support antiaccess strategies aimed at impeding the deployment of U.S. forces to the theater and blunting the operations of those forces that do deploy forward.”¹⁹ In particular, it notes that the United States must prepare to engage adversaries armed with ballistic missiles, anti-ship cruise missiles, and ASAT (antisatellite) weapons; it also observes that the air defenses of all potential adversaries will be “of far greater sophistication and lethality than those fielded by adversaries in the 1990s.”²⁰

Advocates argue that CPGS could fill this alleged “capability gap” in the U.S. strategic posture by providing a conventional weapon that possesses the same speed, range, and ability to penetrate air defenses as a nuclear-armed ICBM or SLBM. CPGS would “provide the United States with a capability that we currently lack: the ability to hit a target anywhere on the earth in less than one hour using a non-nuclear warhead,” explained James Miller, the Principal Deputy Under Secretary of Defense for Policy.²¹

Advocates cite four scenarios in which the United States might need a CPGS capability: when terrorist leaders are located, WMD transfers are suspected, missile launches are imminent, and “high-value” targets (for example, a national leader or command and control nodes) are identified in larger military campaigns.

Senior officials in the Bush administration often evoked these scenarios. For instance, in Senate testimony, Green stated that CPGS capabilities might be necessary to prevent WMD transfers to terrorists, disrupt missile launches by rogue states, and hit targets that are protected by antiaccess capabilities.²² In 2006, General Cartwright noted that a CPGS weapon might have enabled the United States to hit several high-value individuals at the beginning of the wars in Afghanistan and Iraq.²³ In 2007, General Cartwright said that the United States would need CPGS weapons to respond to an attack on U.S. satellites in low Earth orbit, though he did not argue that the United States could suppress

a sophisticated ASAT attack exclusively by employing CPGS weapons.²⁴

The Obama administration’s statements about CPGS employment are less specific (although this may change as it attempts to persuade Congress to fund specific CPGS systems). But its strategy and policy reports allude to the same threats that the Bush administration cited. The 2010 *NPR Report* states that CPGS capabilities may be “particularly valuable for the defeat of time-urgent regional threats.”²⁵ The 2010 QDR discusses CPGS systems and long-range strike more broadly as one response to adversaries employing antiaccess strategies.²⁶

Another similarity is that the Obama administration describes the CPGS concept as one element of a broader portfolio of nonnuclear long-range strike assets that it is studying for the fiscal year (FY) 2012 budget. Other systems include penetrating and standoff bombers, air- and sea-launched cruise missiles, electronic warfare capabilities, and the enabling intelligence, surveillance, and reconnaissance (ISR) assets.²⁷ Recall that in 2006 General Cartwright said that CPGS weapons would be for the rare circumstances in which other conventional global strike systems were insufficient. The Obama administration’s decision to study a mix of nonnuclear long-range strike assets suggests that it also sees CPGS as a capability that would compensate for the limitations of other nonnuclear strike assets in rare situations.

Officials in both administrations have argued that a CPGS capability would enhance U.S. deterrence. Flory argued that it would enable the United States to hold at risk a regional adversary’s high-value strategic assets (for example, WMD-armed missiles, command and control nodes, and leadership bunkers) with conventional weapons, which would strengthen the credibility of U.S. deterrence threats in a crisis.²⁸ Bradley Roberts, Deputy Assistant Secretary of Defense for Nuclear and Missile Defense Policy, recently provided a similar explanation for the value of a CPGS capability:

If we’re in a circumstance where we see a heightened risk of war, and . . . North Korea

*transporting a missile to a launch site, standing it up on its launch pad and beginning to mount a nuclear warhead to it. We would like to have to not rely on nuclear weapons to attack that site or threaten to attack that site. . . . A nuclear weapon would be perfectly thorough in dealing with the military threat. We'd like to have other means; we think that would be more credible as a threat in the eye of the North Korean leader that we might actually employ other means.*²⁹

Lastly, the Bush administration did not see CPGS weapons as substitutes for nuclear weapons. Neither does the Obama administration. Some might disagree with this observation. In the absence of a definitive explanation of the CPGS mission, the Obama administration's statements about nonnuclear capabilities and reducing the role of nuclear weapons are open to interpretation. Thus far, there is no evidence that the Obama administration sees CPGS deployments as enabling nuclear force reductions or that the administration plans to rely exclusively or primarily on CPGS weapons to deter threats from nuclear weapons states. The NPR states that nuclear forces "will continue to play an essential role in deterring potential adversaries, reassuring allies and partners around the world and promoting stability globally and in key regions."³⁰ General Kevin Chilton, General Cartwright's successor as USSTRATCOM commander, has said that a CPGS capability would not provide even a 10-for-1 substitute for nuclear weapons for fulfilling U.S. deterrence objectives.³¹

The Obama administration's policy decisions reflect this interpretation. It explicitly rejected a sole-use policy and reserves the right to use nuclear weapons to deter and respond to the full range of threats, nuclear and non-nuclear, from nuclear weapons states and those not in compliance with their nonproliferation obligations; it also pledged to maintain the triad of nuclear ICBMs, SLBMs, and nuclear-capable bombers and refurbish the nuclear infrastructure.³² Indeed, Linton Brooks, the former director of the National Nuclear Security Adminis-

tration, said that he would have "killed" for the budget and high-level attention that the Obama administration is devoting to nuclear weapons issues.³³

Analyzing the Value of CPGS

Given the growing consensus about the value of nonnuclear strategic capabilities and CPGS within the community of former and current U.S. defense officials, it is worth revisiting the analytical arguments underlying enthusiasm for CPGS in both the Bush and Obama administrations.

The 2008 National Research Council Report and the Capability Gap. In 2006, Congress requested that the National Research Council (NRC) of the National Academy of Sciences study the CPGS concept. The NRC report on CPGS is the most comprehensive open source analysis of the subject. Completed during the summer of 2008, it affirmed the Bush administration's rationale for a CPGS capability: "The basic policy conclusion of the Committee on Conventional Prompt Global Strike Capability . . . is that there would be important political and strategic advantages to the United States in being able to strike high-value targets having time-sensitive urgency that could not be effectively engaged by currently available conventional strike systems."³⁴

there is no evidence that the Obama administration plans to rely exclusively or primarily on CPGS weapons to deter threats from nuclear weapons states

The NRC CPGS committee reached this conclusion through a scenario-based analysis of existing conventional strike systems, such as tactical aircraft, bombers, and cruise missiles, and potential CPGS systems. The study described the attributes it perceived as necessary for an effective CPGS capability. It concluded that a 1-hour execution time—the time between an attack order and

when the weapon affects the target—is a justifiable goal for CPGS systems, although some systems that “do not quite” satisfy this requirement are worth consideration. A CPGS capability must be long range, but it need not be capable of reaching everywhere in the world in an hour at all times.³⁵

This conclusion is based on the study’s independent judgment that there are three plausible categories of scenarios where an execution time of an hour would be critical. The categories of scenarios are consistent with those the Bush administration frequently cited. The first two involve actionable intelligence about the location of terrorist leaders and WMD shipments. The study cited U.S. strikes against al Qaeda during the 1990s as an example. It did not provide a historical example of a WMD transfer, but it noted that “experience” suggests that the United States might know the destination or route of a WMD shipment. The third category involves larger military operations. The United States might need to prevent or respond to enemy missile launches. Or it might attempt to degrade an adversary’s command and control network during the opening salvo in a war. As an example, the report cited U.S. air attacks on Iraqi air defenses at the start of the 1991 Gulf War.³⁶

The study derived six test cases from these categories. It scored the performance of the systems in test cases involving combinations of soft, hard, near-surface, deeply buried, and mobile targets and varying adversary air defense capabilities. To guide its analysis, it also identified and ranked the systems according to 15 capability metrics, such as a 1-hour execution time, defense penetration, lethality, and the need for overflight and basing rights. The study only analyzed a modestly sized CPGS force for each test case (that is, approximately 24–28 CPGS weapons).³⁷

Existing systems scored poorly in the test cases. They were vulnerable to air defenses and frequently were unable to satisfy the 1-hour execution time even if they were forward deployed. Coordinating tanker support for tactical aircraft, securing overflight permission, and determining how to bypass enemy air defenses took as

much as 10 to 20 hours in some instances. The study demonstrated, however, that existing systems are highly capable in a wide variety of contingencies. They might suffice if an execution time of several hours is acceptable, and they could accomplish a 1-hour strike in some circumstances. For example, the study concluded that a tactical aircraft that is already in flight when it receives an attack order could conceivably reach a target no more than 500 miles away in an hour.³⁸

unless the CPGS system is capable of in-flight targeting, intelligence about the location of the target would need to be exact prior to launch

The study concluded that CPGS missiles could consistently complete strikes within 1 hour of the order to execute and penetrate air defenses, and were less dependent on forward basing than existing systems. Most of the CPGS systems were superior to existing systems for responding quickly to threats, quickly attacking terrorist/WMD targets, and striking an adversary’s command and control nodes. The study also noted that the Conventional Trident Modification (CTM) was ineffective for attacking known weak points of hard targets, such as vulnerable entrances and exits. A variant of the CTM that would carry larger payloads and the conventional strike missile (CSM) systems performed better in this category. All of the CPGS missiles that the study examined were only effective against “large, complex, hard and buried complexes” that possess a known vulnerability that the United States could exploit. The CTM and CSM systems both struggled to hit moving targets. As with other conventional systems, the CPGS missiles would be unable to destroy many hard and buried targets.³⁹

The study documented a gap in existing U.S. conventional strike capabilities. Its test cases suggest that CPGS weapons would be an imperfect but valuable solution. CPGS weapons would be faster and more

effective against air defenses than other conventional strike assets. In some contingencies, they might provide the United States with an effective conventional strike option that it does not currently possess. At the same time, CPGS would not be a silver bullet. To be effective, CPGS weapons would need to be more accurate than nuclear weapons, and unless the CPGS system is capable of in-flight targeting, intelligence about the location of the target would need to be exact prior to launch.⁴⁰ A modest number of CPGS weapons would not be capable of threatening large sets of hard, deeply buried, or mobile targets. In fact, the NRC study concluded that the United States would need thousands of CPGS missiles to hold Russian nuclear forces at risk.⁴¹ A core policy implication is that a small-scale CPGS capability would not by itself pose a conventional threat to Russian and Chinese nuclear forces.

An independent study by Bruce Sugden reached similar conclusions. Sugden argued that conventional ballistic missiles (CBMs) would be more prompt, possess a greater range, and penetrate air defenses more effectively than manned and unmanned aircraft. He also noted that CBMs would be inferior to existing conventional systems for strikes against hard, deeply buried, and mobile targets because they would carry smaller payloads and have a limited ability to collect and receive targeting data while in flight. On this basis, Sugden concluded that in the near- to mid-term future, CBMs would be preferable for targets that are soft, fixed, time-sensitive, and protected by air defenses.⁴²

CPGS Weapons: Unnecessary, Unusable, and Unwise? Some analysts are skeptical of the NRC study's conclusions. They argue that CPGS missiles would be an ineffective capability: a CPGS strike would be either unnecessary or infeasible and almost always dangerous. To further analyze the CPGS concept in light of these counterarguments, it is worth taking a closer look at the categories of scenarios cited in the NRC Report and other forums.

Terrorist and WMD transfers. Some analysts doubt that the United States will encounter a crisis in which

a CPGS strike is both necessary and feasible. They argue that collecting, analyzing, and vetting intelligence take time. The insights derived during this process often require additional information and further analysis, which usually entails redeploying intelligence assets and consulting with local authorities. By the time the United States is able to verify the location of a target, U.S. forward-deployed or foreign forces could be within striking distance. In other words, the time required to gather the information necessary to execute a CPGS strike would create alternative options for fulfilling U.S. objectives.

Some targets might be so fleeting that the United States would not have time to reposition forward-deployed strike assets to hit time-sensitive targets. Critics argue that in these cases, a CPGS strike would also be infeasible. Without on-site reconnaissance assets, U.S. leaders would lack the requisite information to confirm the target's location with sufficient precision to launch a CPGS strike and estimate collateral damage.⁴³ Senator Jack Reed articulated this reasoning in 2006: "I presume, in terms of developing our intelligence sources, we first have suspicion, then we have information, we go out and verify it, and in that process . . . our national security officials would begin to move assets into the area which would conduct a strike with precision weapons."⁴⁴

This argument has merit because it reflects experience from routine U.S. counterterrorism operations in Iraq, Afghanistan, and Pakistan. The United States would not need CPGS weapons for most counterterrorism and counterproliferation strikes. But CPGS weapons would be for exceptional rather than routine scenarios. The operative question is whether plausible scenarios exist in which the United States could possess actionable intelligence but be unable to strike targets with other conventional strike assets.

The answer is yes. The forward-deployed forces that collect and confirm intelligence about a target might be incapable of disabling or destroying it. For instance, an unmanned aircraft system might be unarmed or adversary forces might destroy it. Special Operations Forces might locate a target but lack the

capability to attack it. Any number of obstacles could prevent on-site assets from successfully engaging a target. Since the scenarios under consideration involve fleeting targets, other forward-deployed forces might be unable to respond in time.⁴⁵

The United States might also acquire actionable intelligence about an urgent target that is out of range of existing U.S. nonnuclear forces. As an example, intelligence sources might provide information about a rail

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car that contains radiological material and is traveling in a country thousands of miles from U.S. conventional forces based in Europe and Asia. U.S. leaders could possess intelligence indicating that once the train arrives in a city, terrorist operatives plan to split up the material and disperse.⁴⁶ Local authorities might not have the capability to reliably intercept the train, seize the material, and maintain custody of it until U.S. reinforcements arrive.

A President might consider employing CPGS weapons in this scenario. According to the NRC study's analysis, the United States is unlikely to be able to execute a direct CPGS strike against a moving train. But it might be possible to delay or derail the train by employing CPGS weapons against the tracks, thus creating a larger window for other U.S. forces to arrive and seize the material. Of course, a President might conclude that a CPGS strike would be too dangerous because it might disperse hazardous materials into a population center.

This scenario involves a low-probability, high-consequence event. It is also hypothetical and subject to manipulation; one could alter a few variables so that a CPGS strike would be unnecessary, too risky, or feasible.

In reality, final decisions about CPGS employment in a specific situation would rest with the President. The issue is whether a President should have a CPGS option in future crises. Because this and similar situations are plausible today, it would be prudent for the United States to acquire a small-scale CPGS capability as a precaution.

Utilizing CPGS weapons against time-urgent, pop-up targets. To be sure, vetting intelligence and weighing the risks and benefits of a CPGS strike against a time-urgent, pop-up target would be a major operational challenge. In theory, the speed of CPGS missiles should increase the deliberation time available to the President because the time between a strike order and target impact will be shorter.⁴⁷ Despite this, deciding to execute a CPGS strike under severe time constraints would still be difficult. A President might make a strategic decision to strike a target, such as Osama bin Laden, in advance. However, he or she would still need to evaluate operational decisions on actionable intelligence on a case-by-case basis because there are too many context-specific variables. For instance, a President would need to weigh the probability that the target would be in the location against the number of civilians who might die in the strike. Informing a President of the potential opportunity for a strike while the Intelligence Community is still vetting sources and analyzing the target might expand the launch-decision timeline. Regardless of the process, however, there will likely be situations in which the due diligence required to justify a strike offsets the speed of CPGS missiles.

Studying the intelligence and decisionmaking timeline for Predator strike operations in Afghanistan and Pakistan might yield insights that help the United States effectively utilize CPGS weapons against pop-up targets. Unfortunately, the risk of a CPGS strike based on faulty intelligence or insufficient deliberation will always exist, though this risk applies to every weapons system.

Communicating targeting information is another challenge of employing CPGS weapons against pop-up targets. As an example, a U.S. *Ohio*-class submarine equipped with CPGS would probably not have the

coordinates of a pop-up target in advance of the crisis. The United States would need to develop procedures to quickly transmit target data to the submarine. U.S. military planners and policymakers would need to anticipate and resolve this and many other operational challenges for an effective CPGS capability against pop-up targets.

Regional powers and near-peer competitors. The NRC report's third category of scenarios involves CPGS strikes embedded in larger military operations. Examples include U.S. CPGS strikes on an adversary's missile launchers or command and control capabilities. Others have suggested that CPGS missiles would be useful for blunting ASAT attacks from near-peer competitors.⁴⁸

**because of the nuclear shadow,
the decision to go to war with a
near peer would be one of the
most difficult that any President
would face**

Some argue that CPGS missiles are unnecessary for wars with regional powers and near-peer competitors because such conflicts would not be a strategic surprise. Rather, relations would sour and tensions would build over time, allowing the United States to position existing conventional systems within striking distance of the adversary during the run-up to war. If U.S. satellites detected a potential adversary preparing for an attack, these assets would provide an array of conventional strike options capable of hitting the same targets that the United States would strike with CPGS missiles.⁴⁹

A period of heightened tension probably would precede a war between the United States and another state. This does not necessarily invalidate the rationale for a small-scale CPGS capability. Crises can escalate precipitously and unexpectedly, and the United States might need to launch rapid strikes to prevent and respond to attacks. Based on the 2010 QDR's analysis, many po-

tential adversaries will possess formidable antiaccess capabilities designed to prevent the United States from forward-deploying and successfully employing existing conventional strike assets. CPGS missiles alone will not enable the United States to overcome antiaccess strategies, but they would contribute to larger military operations against adversaries with antiaccess capabilities.⁵⁰ That contribution could be significant.

In a conflict with a regional power, the United States might destroy vulnerable components of the adversary's air defense network with CPGS missiles prior to high-volume bomber and aircraft strikes against hard targets.⁵¹ Operations against air defense systems might still succeed without CPGS weapons, but they would likely take longer and place a larger number of vulnerable bombers and aircraft at risk. If U.S. leaders believe that a missile launch from an unhardened launcher in a known location is imminent, they might employ CPGS missiles immediately rather than waiting until U.S. forces degrade enemy air defenses.

Although CPGS systems would not be capable of holding large sets of hard and deeply buried targets at risk, some systems might have utility against a small number of such targets depending on the system and the target. For instance, a CPGS missile strike against the entrances of an underground facility might delay the dispersal of an adversary's missiles and buy time for follow-on bomber and cruise missile strikes.⁵² Even if CPGS missiles hit the entrances less than an hour before other conventional strike assets, U.S. chances of thwarting a WMD attack might increase significantly. If the United States has intelligence about a high-impact target, such as vulnerable but critical command and control nodes or leadership locations, a CPGS missile might be the quickest and most effective strike option.

The prospect of employing CPGS missiles against a nuclear-armed, near-peer competitor in response to an ASAT attack has generated much controversy. To be clear, the CPGS concept is not intended as a one-stop solution to U.S. vulnerability in space. Deterring and responding to ASAT attacks would likely require a multipronged

approach. It would probably entail a mix of offensive capabilities—the ability to reposition satellites, offload services to other satellites and terrestrial assets, operate with a degraded satellite capability, and many other measures. Obama administration statements suggest that it does not equate deterrence in space to offensive retaliation, let alone retaliation with CPGS missiles.⁵³

Independent analyst Joshua Pollack asks an excellent question: “If the protection of a particular asset, say, a satellite constellation, requires gambling with millions of lives, is that asset worth protecting?”⁵⁴ One would hope that a President would consider this in a crisis with a near peer. Of course, there would be an inherent risk of escalation in any conventional war between two nuclear powers. Employing CPGS weapons might exacerbate this risk in some circumstances, but possession of a modest number of CPGS weapons is unlikely to make a U.S. conventional war with a near peer more likely. Because of the nuclear shadow, the strategic decision to go to war with a near peer would always be one of the most difficult that any President would face. This will not change after the United States deploys CPGS weapons. (For a discussion of CPGS ambiguity and misinterpretation risks with Russia and China, see the next section.)

Whether the United States should acquire or forgo a CPGS capability and whether the United States should go to war with a near-peer competitor in a specific situation are two distinct issues. Calculations about the benefits and risks of striking a near-peer competitor with CPGS missiles, or other conventional systems, would depend on the situation, though a war with such a competitor would be extremely risky under any circumstances. Few would question this, but it is not the core issue in the debate about CPGS acquisition.

CPGS weapons might enhance U.S. conventional military operations in a war with a near peer; for instance, in very rare circumstances, the United States might utilize the speed and access of CPGS weapons in a larger strike that employs other nonnuclear assets as well. However, simply because CPGS weapons might be useful in a war with a near peer does not mean that

the United States would develop a CPGS capability primarily for this purpose. The CPGS concept is attractive because it would better equip the United States to deter and respond to a variety of threats and crises. But in the absence of the threat from terrorists and unpredictable regional powers, the rationale for a niche CPGS capability would be much less compelling because the odds of a war with a near-peer competitor are so remote.

Preparing for CPGS Employment in War. Employing CPGS weapons to achieve the desired effects in a war would require preparation. Civilian and military planners must incorporate CPGS weapons into existing plans, and senior officials and commanders would need to think through how best to utilize the mix of CPGS weapons, other conventional and nonkinetic assets, and missile defenses in a variety of contingencies. Decisions about CPGS employment would vary according to the situation, but senior officials and military commanders would probably make better choices during a crisis if they have thought through the conceptual benefits, risks, and tradeoffs beforehand.

if the United States deploys a CPGS system, potential reactions to such employment are another variable that the Intelligence Community would need to research and analyze

As an example, evaluating the escalation risks of CPGS employment against specific adversaries merits further study. Detailed assessments of potential adversaries are a fundamental ingredient of tailored deterrence. Defense planners must explore whether some potential adversaries would react more severely to a CPGS strike than to an attack against the same target with other nonnuclear means. The U.S. Intelligence Community must account for the unique capabilities, command authority and decisionmaking structures,

leadership traits, strategic cultures, and doctrines of specific actors. These analyses probably exist already and are routinely reassessed. If the United States deploys a CPGS system, potential reactions to such employment are another variable that the Intelligence Community would need to research and analyze.

Military planners would also need to evaluate which specific targets the United States can affect with CPGS weapons. This process will involve detailed technical and intelligence analyses about the locations and vulnerabilities of specific targets. Understanding the probable effect of CPGS weapons against specific targets will enable the United States to best allocate limited CPGS assets against larger target sets.

deploying CPGS weapons might allow the United States to create conventional strike options for a small number of the targets that it currently can attack only with nuclear weapons

How Do CPGS Weapons Reduce the Role of Nuclear Weapons? The Obama administration might provide a more detailed explanation of how CPGS weapons reduce the role of nuclear weapons after it submits its FY12 budget request. For now, however, the relationship between CPGS weapons and nuclear weapons is inchoate.

The NRC study concluded that CPGS weapons would provide the United States with a new military option in circumstances in which a President is unlikely to resort to nuclear force but cannot accomplish national objectives with current U.S. conventional capabilities:

CPGS would be a valuable new instrument of national policy because in extremely serious cases it would avoid the dilemma of having to choose between using a nuclear weapon or making no response at all. The committee believes that in the

*face of such a dilemma, the disadvantages of using nuclear weapons are such that there are very few cases in which the President would actually choose to use a nuclear weapon.*⁵⁵

Thus, a CPGS capability might prevent the United States from having no appropriate military options to respond to a serious threat. Alternatively, it might prevent a President from using a nuclear weapon as a substitute for a conventional strike option that would not exist without a CPGS capability.

A plausible variant is that a President might have to choose between a nuclear response and a less effective conventional response. For instance, an adversary might be preparing to launch short- and medium-range conventional missiles at U.S. forces and allies. Existing U.S. conventional forces might be unable to penetrate or avoid the adversary's air defenses quickly enough to prevent the missile launch or to rapidly degrade the missile forces, but the incentives against nuclear force employment would still be very strong. In this instance, CPGS weapons might enable the United States to respond more quickly and effectively, and probably save more lives.

Operationally, a small-scale CPGS capability would likely incrementally expand the range of targets that the United States could destroy with conventional weapons. In other words, deploying CPGS weapons might allow the United States to create conventional strike options for a small number of the targets that it currently can attack only with nuclear weapons.

This is not without precedent. In 2007, General Cartwright explained that the United States previously needed nuclear-armed cruise missiles to destroy integrated air defenses, but could now credibly threaten these targets with conventional cruise missiles: "And so we've been able to offload some of those targets, and that has allowed us to stay on track in the reduction of operationally deployed nuclear weapons."⁵⁶ The 2010 *NPR Report* reflects this: "But fundamental changes in the international security environment in recent years—including the growth of unrivaled U.S. conventional mili-

tary capabilities . . . enable us to fulfill those objectives [deterrence, assurance, and promoting global stability] at significantly lower nuclear force levels and with reduced reliance on nuclear weapons.”⁵⁷ In this sense, CPGS weapons would reduce the role of nuclear weapons by providing conventional alternatives to nuclear weapons against some targets.

However, a modestly sized CPGS force would not be able to satisfy the requirements that U.S. leadership perceives as necessary to deter nuclear weapons states and states not in compliance with their nonproliferation obligations. For instance, U.S. policy on deterring Russia requires holding at risk those targets that the United States believes a potentially hostile Russia would value. Historically, implementing this policy has meant meeting a high standard of destruction in four categories: nuclear forces, other military forces, economic and industrial targets, and leadership command, control, communications, and intelligence assets. As the NRC study demonstrated, the United States would need thousands of CPGS missiles to do this.⁵⁸

The Obama administration does not plan to undertake large-scale CPGS deployments. Administration officials have described CPGS long-range ballistic missiles as a “niche” capability.⁵⁹ A core policy implication is that CPGS weapons would not play a significant role in reducing the number of nuclear weapons that the United States deploys unless policymakers dramatically alter U.S. strategic deterrence requirements.

In theory, a President might employ CPGS weapons against a target that would have required a nuclear response prior to the existence of CPGS missiles. For instance, without a CPGS capability, nuclear missiles might offer the fastest strike option against a regional power’s difficult-to-reach WMD-armed missiles. If U.S. leaders thought that an adversary attack was imminent, they might conclude that nuclear weapons offered the only strike option that could reliably prevent the adversary from launching all or some of its missiles. If CPGS missiles offer an effective conventional strike option that existing conventional systems cannot provide, they might substitute for nuclear weapons—

thereby reducing the role of nuclear weapons—in that specific situation.

Some might perceive this hypothetical scenario as contrived. The bar for the U.S. use of nuclear weapons is very high. One could argue that in a situation in which a President would seriously consider employing even a single nuclear weapon, the stakes would be of such magnitude that he or she would probably not risk relying on conventional weapons.⁶⁰ On the other hand, if a President was reasonably confident that the United States could accomplish its objectives with CPGS missiles (and perhaps missile defenses and follow-on strikes with other non-nuclear forces), he or she would have strong incentives to respond to the situation without using nuclear weapons.

As one element of a larger set of nonnuclear capabilities that increase the versatility of the U.S. strategic posture, CPGS weapons could make an incremental but important contribution to deterrence of potential adversaries and assurance of U.S. allies.

In the short term, the threat from nonstate actors may become more severe, rogue states may develop more advanced air defense and missile capabilities, and near-peer competitors will likely acquire improved antiaccess capabilities. Against this backdrop, U.S. leaders, allies, and potential adversaries may perceive current U.S. conventional weapons systems as inadequate for fulfilling extended deterrence objectives in some circumstances. The utility of U.S. nonnuclear strategic capabilities—CPGS weapons, other nonnuclear strike assets, and missile defenses—is that allies and potential adversaries may perceive them as an effective and more usable (and thus credible) set of military options for some emerging threats. This would enhance deterrence against an increasingly diverse and sophisticated spectrum of threats against which other conventional weapons may be of questionable effectiveness but where the threat of nuclear retaliation would not be credible in the eyes of U.S. allies and adversaries.

Is CPGS Too Expensive for a Niche Capability?

Developing and deploying a small number of CPGS weapons will be costly.⁶¹ As the United States approaches a period of constrained budgets, some might fairly

question whether expending substantial resources for a niche capability is a worthwhile investment. The United States deploys high-end strategic capabilities for dire scenarios that most U.S. officials hope will never occur. In such circumstances, however, a President would probably want a versatile strategic toolkit. A small number of conventional long-range missiles might be worth the cost if they add strategic flexibility by filling the gap between existing conventional systems and nuclear forces.

CPGS Ambiguity and Misinterpretation

The most pervasive objection to CPGS is the risk of ambiguity and misinterpretation. Critics argue that other countries will be unable to distinguish U.S. conventional long-range ballistic missiles from U.S. nuclear-armed ICBMs and SLBMs. They fear that Russian officials will detect the launch of a CPGS missile, conclude that the United States has launched a nuclear attack, and launch nuclear weapons in retaliation.

concerns about CPGS ambiguity focus primarily on Russia because it possesses a massive nuclear arsenal and is capable of detecting and tracking long-range missile launches

Concerns about CPGS ambiguity focus primarily on Russia because it possesses a massive nuclear arsenal and is capable of detecting and tracking long-range missile launches. In the near- to mid-term future, however, China may develop launch detection and early warning capabilities. This is significant because a nation cannot misinterpret a CPGS strike as a nuclear attack if it does not have the capability to detect long-range missiles prior to impact.

Congress and CPGS Ambiguity. Congressional concerns about CPGS ambiguity arose as the Bush administration attempted to gain funding for the CTM system, which would mate a conventional warhead with

the existing Trident D-5 missile. The Bush administration initially sought funding to deploy two CTM missiles alongside the nuclear-armed Trident D-5 missiles on the 12 deployed *Ohio*-class submarines by 2008. Administration officials argued that the CTM is the quickest and most affordable path to a CPGS capability because it would rely primarily on existing technology.⁶²

The Bush administration was unable to persuade Congress to provide the funding necessary to develop and deploy CTM missiles by 2008.⁶³ The risk of CPGS ambiguity triggering a Russian nuclear strike was central to congressional opposition. For instance, Senator Carl Levin (D-MI) said: “Now, those D-5 missiles today carry nuclear warheads, and there’s a real question as to whether we are creating a very dangerous ambiguity if we proceed to have on a boat either D-5 conventional or D-5 nuclear. And I’m just wondering . . . if other countries are not clear as to whether or not a launch is a nuclear or conventional launch. It creates huge dangers.”⁶⁴ Similarly, Senators Daniel Inouye (D-HI) and Ted Stevens (R-AK) listed the ambiguity issue as a core concern in a letter to the National Academy of Sciences explaining Congress’s decision to request an independent NRC study of CPGS: “The fact that one would not be able to differentiate between a conventional missile launch and a nuclear missile launch from a Trident submarine was viewed with particular concern by those of us who opposed the program.”⁶⁵

Congress did not completely reject the CPGS concept. For FY08, it created a single CPGS program element for the development of alternative non-CTM CPGS systems.⁶⁶ One alternative is the land-based CSM. The Air Force’s CSM envisions mating a modified ICBM, known as the Minotaur IV, with a boost-glide reentry vehicle (commonly referred to as the Hypersonic Glide Vehicle) that would deliver the warhead to its target. If the technology develops as planned, the boost-glide vehicle would maneuver and deviate from a ballistic trajectory after it separates from the missile.⁶⁷ Obama administration officials have recently stated that the CSM (and boost-glide CPGS concepts more generally) would mitigate the ambiguity risk because they

would follow a ballistic trajectory for less than half of their flight (whereas ICBMs and SLBMs are ballistic for the entire flight) and would be able to “steer around” countries such as Russia.⁶⁸ Sugden reaches a similar conclusion: “CBMs [conventional ballistic missiles] based in the continental United States and at forward locations that carry boost-glide vehicles, ideal for shaped trajectories, would mitigate the risks of ambiguous warning.”⁶⁹

The Obama administration requested \$136.6 million to further develop the boost-glide component of the CSM for FY11. The Budget Item Justification stated that the CSM is the lead design to demonstrate a CPGS capability. It also requested \$69 million to test and evaluate the Army’s Hypersonic Glide Body concept, which is an alternative risk reduction path for the CSM.⁷⁰ The Obama administration is still conducting its nonnuclear long-range strike study, and has not ruled out further efforts to develop the CTM concept (see section on New START for more on this).

NRC Assessment of CPGS Ambiguity. Congress tasked the NRC study to examine the ambiguity risks associated with the CTM and CPGS concepts. As the Obama administration has already requested further CPGS funding and is evaluating different systems, it is worth reviewing the analysis in the NRC report.

The NRC study concluded that the ambiguity risks would be manageable and should not preclude the development of a CPGS capability. The study argued that, after years of observing U.S. CPGS policy debates, acquisition decisions, and weapons tests and deployments, and participating in dialogues on CPGS issues with U.S. officials, other nations would be unlikely to misinterpret a CPGS launch as a nuclear attack. Rather, they would probably anticipate U.S. CPGS strikes in wars and crises. As examples, the study noted that the B-52, B-1, B-2, fighter bombers, and air- and sea-launched cruise missiles are all used for conventional strikes even though they initially carried only nuclear warheads.⁷¹

Additionally, it noted that ambiguity risks with Russia will flow from the context in which the United States employs CPGS missiles. For instance, if Russia detects

the launch of a few U.S. CPGS missiles but is unsure of their location and payload (conventional or nuclear), Russian leaders would “be unlikely to conclude that the United States was starting a nuclear war with Russia in a ‘bolt-from-the-blue’ attack with so few missiles.”⁷² At the very least, Russian leaders would have strong incentives to wait until they had more information about the targets of such a small strike before employing their nuclear forces against the United States.

The study acknowledged that there would be inherent ambiguity risks in U.S. CPGS launches. But it concluded that the United States could reduce this through confidence-building measures. For example, the United States could invite Russia, China, and other nations to participate in some or all of the following confidence-building measures: “These could include cooperative measures to increase information about the system and its operations (notification, transparency arrangements, a joint warning center, data exchanges, participation in and observation of exercises, inspection regimes) as well as extensive and candid discussions of the nature of the system and the U.S. doctrine for its use.”⁷³

The NRC report’s analysis is persuasive. The international security policy community has been analyzing and debating the CPGS and CTM concepts since 2006. If the United States moves forward with a CPGS system, Russia, China, and others will possess a voluminous body of knowledge about the size and characteristics of U.S. CPGS forces and the situations in which the United States might use them. If employed against a third party (that is, not Russia or China), the confluence of these overlapping sources of information, launch notification arrangements, and the context (for example, periods of heightened tension preceding a U.S. war with a third party or an absence of U.S.-Russian or Chinese tensions preceding a CPGS strike against a nonstate actor) would provide Russian and Chinese officials with a set of metrics to distinguish a U.S. CPGS strike from a nuclear attack.

Moreover, Russia has long had a survivable second strike capability. China is clearly investing to improve its confidence in the survivability of its strategic forces

through modernization, hardening, mobility, and concealment.⁷⁴ Neither is vulnerable to a disarming U.S. first strike. An underlying motivation of achieving a survivable second strike is that national leaders can confidently “ride out” ambiguous missile launches because they are not at risk of losing the ability to retaliate. Neither Russian nor Chinese officials would have strong incentives to employ nuclear force in response to a small, ambiguous U.S. missile launch.

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This reasoning supports the development of a CPGS capability, but it does not suggest that the risk of ambiguity and misinterpretation would be acceptable in all circumstances. Prior to CPGS deployments, U.S. officials should identify aggravating factors that would raise the probability of Russia or China misinterpreting a CPGS strike against a third party as a nuclear attack against it. For example, a CPGS strike against a terrorist might be too risky if the United States and China are embroiled in a crisis over Taiwan. A CPGS strike while Russia or China is on the cusp of a conflict with another nuclear-armed power might be too dangerous as well. Identifying red flags in advance will help senior decisionmakers assess ambiguity risks in a crisis.

Controversy over the NRC Report. Several of the NRC report’s assertions about CPGS strikes against a near peer overshadowed much of this analysis. The report stated that the “probability of a nuclear response to such a conventional attack is surely lower than the probability of a nuclear response to a nuclear attack.” It also argued that the ambiguity risks of a U.S. CPGS strike against either Russia or China are higher than

those in other cases, but not high enough to rule out the option in all circumstances.⁷⁵

Sugden questions this logic, and Pollack describes it as exhibiting a sanguine attitude about nuclear escalation that “could justify almost any act imaginable.”⁷⁶ To be fair, the NRC report also stated that it is difficult to “conceive of situations in which the benefits of using CPGS against targets in Russia or China would outweigh the risks.”⁷⁷

As we argued earlier, this debate is not pertinent to the core issues surrounding CPGS acquisition. In a specific situation, a niche CPGS capability is unlikely to have a decisive impact on whether the United States would go to war with a near-peer competitor. The NRC study’s central conclusion that CPGS ambiguity risks are serious but not prohibitive is persuasive.

Acquisition Decisions That Affect Ambiguity. Russia and China would likely be able to assess U.S. CPGS launches with their own technical means.⁷⁸ What they are able to determine about U.S. CPGS launches will affect the ambiguity risks. This is relevant to the FY12 budgetary decisions about CPGS because many currently assume that the CSM is less ambiguous than the CTM.

The NRC study’s analysis, however, suggested that the ambiguity tradeoffs between the CSM and the CTM are not clear cut. An effective launch detection and tracking system can quickly identify a ballistic missile’s flight path and determine its destination. This would apply to the CTM. Alternatively, if a CPGS weapons system, such as the CSM, employs a maneuverable boost-glide vehicle, an observing nation’s technical means will not be able to determine its target until very late in flight, if at all.⁷⁹

We compare the CTM and the CSM according to warhead and destination ambiguity to further flesh out the implications of this distinction. *Warhead ambiguity* is when the target of a U.S. CPGS strike correctly or incorrectly concludes that the attack is directed against it, but misinterprets the attack as a nuclear strike. *Destination ambiguity* is when a state observes a U.S. CPGS strike against a third party and incorrectly concludes that it is under nuclear or conventional attack. A variant is if a state correctly or incorrectly concludes that the United States

is attacking it with a CPGS weapon but does not know whether the strike is directed against its nuclear forces, conventional forces, or command and control centers.

Warhead and destination ambiguity would play out differently for the CTM and the CSM (see table).

The CTM and CSM are both ambiguous but in different ways. Assuming that Russia and China possess adequate launch detection and early warning systems, each country's leaders would likely be able to determine if a CTM strike is aimed at them. But they would not be able to verify whether it is carrying a conventional or nuclear warhead. Alternatively, Russian and Chinese officials might quickly identify an incoming U.S. CSM strike as fitting the profile of a conventional missile. Their inability to predetermine the target of the strike, however, could exacerbate their fears of losing critical strategic assets, such as some of their nuclear missiles and command and control capabilities. And they could not be certain that the CSM is carrying a conventional warhead.

Russian and Chinese leaders might not believe U.S. assurances about the conventional warhead on CPGS missiles or U.S. notifications of the targets of CPGS launches. The CTM concept better mitigates the risk that either Russia or China might launch its nuclear forces due to uncertainty about the target of an ambiguous U.S. CPGS strike than does the CSM; assuming functioning early warning systems, Russian and Chinese officials would at least be better able to assess whether they are the target of a CPGS strike, and if they are, what assets the United States is attempting to destroy.

Upcoming CPGS Policy Issues

Implications of New START for CPGS. Conventionally armed ICBM and SLBM systems that travel along a ballistic trajectory for over half of their flight paths (which would include the CTM) would count toward New START limits. The Obama administration has argued that New START would not constrain U.S. ability to deploy a sufficient number of CPGS weapons.⁸⁰ The *NPR Report* states that the force structure analysis that informed the U.S. New START negotiating positions on

acceptable warhead, delivery vehicle, and launcher limitations assumed that the United States would deploy a small number of treaty-accountable nonnuclear systems.⁸¹

This is an important point. Critics of New START note that it would require the United States to trade deployed nuclear weapons for deployed conventional long-range ballistic missiles on a one-for-one basis.⁸² Though technically true, the 2010 *NPR Report* and subsequent administration testimony make clear that the United States negotiated limitations that would allow it to deploy a sufficient number of CTM missiles in addition to the nuclear force levels the senior leadership deemed necessary to fulfill U.S. strategic objectives. Therefore, deploying, as an example, 24 to 28 CTM missiles (for example, 2 CTMs on 12 to 14 submarines)⁸³ would not require the United States to drop below the 2010 NPR's minimum nuclear force requirements by 24 to 28 nuclear weapons.

The Obama administration's article-by-article analysis states that the United States would not consider "strategic range non-nuclear systems that do not otherwise meet the definitions of the Treaty" to count against the treaty's limits.⁸⁴ Administration officials emphasize that the treaty would not capture future CPGS systems that use boost-glide vehicles, such as the CSM.⁸⁵ Presumably, these systems would not meet New START's definition of a ballistic missile because they would travel along a ballistic trajectory for less than half of their flight paths.⁸⁶

Despite the U.S. position, Russia would have the right to bring the issue before the Bilateral Consultative Commission if it chooses to contend that these "nonballistic" CPGS systems count against the treaty's limits. This would not legally prohibit the United States from deploying such systems. Nor is it certain how Russia would react if the United States refuses to treat nonballistic CPGS systems as treaty-accountable. After all, Russia did not withdraw from START after the United States withdrew from the Anti-Ballistic Missile Treaty. But Russian officials might attempt to use New START to constrain deployments of CPGS systems

Comparison of CTM and CSM Ambiguity

	Warhead Ambiguity	Destination Ambiguity
Conventional Trident Modification (CTM)	The CTM carries a risk of warhead ambiguity because it would launch from the same platform and have the same trajectory as U.S. nuclear-armed Trident D-5 missiles. Even if a nation's technical means determine where the missile will land by examining its trajectory, national leaders would be unable to independently verify whether the CTM is carrying a conventional or nuclear warhead until it reaches the target. Knowledge of the target of a U.S. strike, however, might provide observing countries with clues about the warheads; foreign leaders might conclude that an incoming strike is conventional if they believe that a U.S. nuclear strike against a nonnuclear target is highly unlikely.	The CTM would carry less risk of destination ambiguity because it would follow a totally ballistic trajectory. If a nation has the technological capacity for early warning, it could determine a CTM missile's destination before target impact. One Bush administration official said that Russia's early warning system has the capability to determine a missile's aimpoint within tens of miles. ¹
Conventional Strike Missile (CSM)	The CSM system would possess two unique attributes that might distinguish it from nuclear-armed intercontinental ballistic missiles (ICBMs). First, the United States would deploy and launch CSMs from different geographic locations within the United States than its nuclear ICBMs. ² Second, because of its boost-glide reentry vehicle, it will travel along a different trajectory than a nuclear ICBM. ³ In principle, an observing nation's launch detection and early warning system should be able to observe these differences, thereby allowing national leaders to confirm that the missile fits the profile of a CSM. Foreign officials, however, may not believe that U.S. CSMs only carry conventional warheads, creating a residual risk of ambiguity.	If successfully developed, the boost-glide reentry vehicle would enable the United States to avoid flying over certain countries, such as Russia. The ability to maneuver, however, prevents an observing country from using its technical means to determine the destination of a CSM before it hits its target. ⁴ This will increase the risk of destination ambiguity because observing countries would be unable to determine promptly if the strike is aimed at them. If it is, they would be unable to determine if the strike is aimed at their nuclear forces and nuclear command and control assets or at other nonnuclear targets.

¹ Brian R. Green, testimony for the Senate Armed Services Committee Strategic Forces Subcommittee Hearing Regarding Global Strike Issues, March 28, 2007, 8.

² Amy F. Woolf, "Conventional Warheads for Long-range Ballistic Missiles: Background and Issues for Congress," Congressional Research Service, RL33067, January 26, 2009, 11.

³ James Miller, testimony for the Senate Foreign Relations Committee Hearing on the New START Treaty: Views from the Pentagon, June 16, 2010, 4–5.

⁴ National Research Council, Committee on Conventional Prompt Global Strike Capability, *U.S. Conventional Prompt Global Strike: Issues for 2008 and Beyond* (Washington, DC: National Academies Press, 2008), 72.

that the United States considers outside the confines of New START.

Boost-glide vehicle CPGS systems might ultimately turn out to be prohibitively expensive or technologically infeasible. Even then, the United States would likely be able to deploy a sufficient number of treaty-accountable CPGS systems for a niche capability without chafing under the treaty's limits.

However, some analysts argue that the Obama administration should have excluded conventional long-range ballistic missiles from the treaty. For instance, Eric Edelman said, "We do not yet know what the requirements for PGS will be, and thus run a substantial risk of putting the arms control cart ahead of the capability requirements horse."⁸⁷ In other words, the United States might need to deploy more CPGS weapons than the Obama administration anticipated. For example, the antiaccess capabilities of potential adversaries might become more capable than the 2010 QDR analysis projected.⁸⁸ According to this logic, if the CTM is the only feasible CPGS system and the strategic environment unexpectedly worsens, the United States might face a one-for-one tradeoff between its baseline nuclear force requirements and additional CPGS weapons beyond the margin protected in the New START negotiations.

New START does not risk this worst-case scenario. The treaty will remain in force for 10 years, with an option for extending it for a maximum of 5 more years.⁸⁹ The United States could allow the treaty to expire at the end of the 10-year timeframe if U.S. officials perceive a need for a much larger CPGS force. What is more, it would take years for U.S. officials to identify the need for a larger CTM force, generate the political support necessary to fund such a decision, and build and deploy the additional CPGS missiles. Even if the United States dramatically altered its CPGS requirements early in the treaty's life, therefore, New START probably would not *constrain* U.S. CPGS deployments while the treaty is in force.

Lastly, treaty limitations did not derail the Bush administration's plan to deploy the CTM; the problem

was a lack of political support. CPGS proponents should keep this in mind. A Senate rejection of New START because it counts some CPGS systems would not have guaranteed congressional funding for CPGS. Emphasizing the continued interest in CPGS and the CTM system across two administrations is a more effective strategy for achieving sustainable congressional support.

Strategic Stability Dialogues with Russia and China. The 2010 *NPR Report* states that the United States will pursue high-level dialogues with Russia and China to facilitate "more stable, resilient, and transparent strategic relationships."⁹⁰ Administration officials have acknowledged that Russia and China are concerned about the CPGS concept, especially the prospect of conventional long-range ballistic missiles. For instance, the report emphasizes that future deployments of conventional long-range ballistic missiles would be "designed to address newly emerging regional threats, and not intended to affect the strategic balance with Russia."⁹¹ General Chilton said that the United States would size its CPGS force to avoid "perturbing our strategic relationship with Russia and China."⁹²

Russian and Chinese officials, however, have stated that the CPGS concept would undermine strategic stability. For instance, Russian Foreign Minister Sergei Lavrov said: "World leaders will hardly accept a situation in which nuclear weapons disappear, but weapons that are no less destabilizing emerge."⁹³ Chinese officials have voiced similar concerns. In a discussion of the Bush administration's New Triad, Wang Zhongchun, professor and senior colonel in the People's Liberation Army, argued that "once the system is completed, the United States will obtain a strategic deterrent force with both offensive and defensive capabilities, which could pose serious challenges to the limited nuclear deterrent capabilities of medium-sized nuclear countries."⁹⁴

A modest number of CPGS weapons would not enable the United States to rapidly degrade Russia's or China's strategic forces with conventional weapons. Russian and Chinese foreign officials may exaggerate the negative consequences of U.S. CPGS systems in their public statements. These quotes, however, illustrate apparent Russian

and Chinese concerns about new U.S. strategic capabilities, especially CPGS weapons and missile defenses.

Strategic stability dialogues are a good venue to address Russian and Chinese concerns about U.S. CPGS deployments. Explaining the purpose and role of CPGS weapons to Russian and Chinese officials would help them to better understand when, and against what targets, the United States might employ these capabilities. At the very least, this should reinforce U.S. CPGS launch notification and confidence-building measures. For instance, the United States could explain to Russian and Chinese officials that a sophisticated launch detection and early warning system would allow them to independently assess U.S. CPGS launches. Regardless of the CPGS system that the United States would deploy, a functioning early warning system would provide both countries with more situational awareness about CPGS launches than they would otherwise possess.

A logical starting point would be to engage Russia on implementing a Joint Data Exchange Center (JDEC) for early warning information. This might be an effective venue to provide Russia with information about the trajectory of CPGS launches. Unfortunately, the U.S.-Russian agreement to form a JDEC has expired. That Russia held up the implementation of the JDEC over bureaucratic issues for more than a decade suggests that Russian officials are not seriously concerned about miscalculation over faulty or ambiguous early warning information. The United States should propose the renewal and standing-up of the JDEC. At the very least, this will help U.S. officials gauge whether Russia is interested in addressing the CPGS issue constructively.

China may be unwilling to discuss its early warning system plans and capabilities with the United States. CPGS launch notification could be a useful starting point for a U.S.-Chinese discussion of CPGS. Though the United States and China have a formal military-to-military hotline, they do not have much experience using it. Nor can senior U.S. officials assume that they would be able to promptly reach their Chinese counterparts in a crisis. The United States should attempt to develop a mutually recognized set of procedures for CPGS notification with China. Perhaps

the two countries could participate in exercises or simulations in which U.S. officials notify their Chinese counterparts of a CPGS strike against a terrorist target. This would likely contribute to the broader U.S. effort to develop a more transparent and resilient strategic relationship with China.

This is not to say that strategic stability dialogues will alleviate Russian and Chinese anxiety about U.S. CPGS deployments. Russian officials might perceive a CPGS capability as threatening Russia's nuclear deterrent even if the United States deploys fewer than 50 CPGS weapons. Similarly, Chinese leaders might perceive CPGS weapons as part of a U.S. effort to offset China's antiaccess capabilities, and therefore as threatening and destabilizing, despite strategic discussions with U.S. defense officials.

Moreover, Russian and Chinese concerns about the impact of CPGS reflect a larger trend: the military balance between the United States and near peers encompasses a broader set of capabilities than offensive nuclear weapons. It also includes conventional weapons systems, nonnuclear long-range strike capabilities (for example, CPGS and ASAT weapons), missile defenses, the space and cyber assets that underlie command, control, and ISR capabilities, and offensive cyber operations.

One goal of strategic dialogues, therefore, should be to further explain to Russian and Chinese officials the objectives, scope, and drivers of the evolving U.S. strategic posture. As an example, U.S. officials could continue to explain that the United States is developing a more diverse strategic portfolio to address threats from regional powers such as Iran and North Korea as well as nonstate actors. Even though the United States will not forswear the potential use of these capabilities against Russia and China, it is not pursuing a first strike advantage over either country. Eliminating Russian and Chinese concerns is unrealistic, but perhaps the United States can attenuate them.

A related goal is for U.S. officials to understand better how Russian and Chinese strategists perceive U.S. capabilities, and how they aim to offset U.S. military advantages with their strategic forces. The United States will never possess perfect information about

Russian and Chinese perceptions, but reducing ignorance on these issues as much as possible is desirable. Building a common conceptual framework should help all three countries avoid misperceptions and miscalculations about the objectives, concerns, and capabilities of the others. In this context, discussing U.S. CPGS deployments with Russia and China would be one component of a dialogue about a larger and more complex mix of strategic capabilities.

Conclusion

As the world changes and threats evolve, so too must U.S. priorities, policies, and capabilities. For instance, preventing a large-scale nuclear attack against the United States and its allies remains a top priority, but a failure to reorient U.S. policies to combat the less-devastating but more probable threat of nuclear terrorism would be reckless.

Few serious analysts would question this. Yet there is no consensus on whether and how the United States should modify its strategic offensive capabilities. A long-range missile is a highly effective way to deliver a payload to distant and denied targets. Recognizing this, is it logical to deploy only long-range missiles armed with nuclear warheads? Should the United States preserve its strategic arsenal in precisely the same configuration as it was at the end of the Cold War, albeit in smaller numbers? Or should the United States alter a small portion of its most potent strategic delivery vehicles in response to a spectrum of threats and actors that is more diverse and complex than it was during the Cold War?

The answer to the final question is *yes*: a CPGS capability would be a valuable strategic asset. A long-range missile armed with a conventional warhead would not be the optimal strike option in all circumstances, but it might provide the best available means for achieving U.S. objectives in some plausible high-risk scenarios.

Developing and deploying a CPGS capability that enhances U.S. deterrence and assurance without undermining strategic stability with Russia and China would require a good deal of persuasion. Internationally, the United States should make efforts to persuade Russia and China that a

niche CPGS capability would not threaten the credibility of their nuclear deterrent forces. Within the United States, advocates of CPGS need to persuade skeptics in Congress and the analytical community that a CPGS capability would be worth the cost and that the ambiguity and misinterpretation risks are manageable. As a first step toward building bipartisan support, former Bush administration officials should credit the Obama administration for pursuing the CPGS concept, and Obama administration officials should note the continuity with the Bush administration on the need for CPGS. Policy differences on other strategic issues should not obscure mutual support for a Conventional Prompt Global Strike capability.

Notes

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² See "Fact Sheet on Nuclear Posture Review Background," August 6, 2009, available at <www.armscontrolwonk.com/file_download/193/NPR_Background.pdf>; Bradley H. Roberts, testimony for the Senate Armed Services Committee Strategic Forces Subcommittee Hearing to Receive Testimony on Strategic Force Programs in Review of the Defense Authorization Request for Fiscal Year 2011 and the Future Years Defense Program, March 17, 2010, 8, available at <<http://armed-services.senate.gov/Transcripts/2010/03%20March/10-21%20-%203-17-10.pdf>>.

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⁵ Joseph Biden, "The Path to Nuclear Security: Implementing the President's Prague Agenda," remarks at the National Defense University, Washington, DC, February 18, 2010.

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⁷ Department of Defense, *Ballistic Missile Defense Review Report* (Washington, DC: Department of Defense, February 2010), 23.

⁸ Donald Rumsfeld, *Department of Defense Annual Report to the President and Congress* (Washington, DC: Department of Defense, 2002), chap. 7, 2–4.

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¹¹ Brian R. Green, testimony for the Senate Armed Services Committee Strategic Forces Subcommittee Hearing Regarding Global Strike Issues, March 28, 2007, 2.

¹² Peter C.W. Flory, testimony for the Senate Armed Services Committee Strategic Forces Subcommittee Hearing Regarding Global Strike Issues, March 29, 2006, 4.

¹³ Department of Defense, *Quadrennial Defense Review [QDR] Report* (Washington, DC: Department of Defense, February 2010), 5.

¹⁴ *Ibid.*, 11.

¹⁵ Department of Defense news briefing with Under Secretary of Defense for Policy Michèle Flournoy and Vice Admiral P. Stephen Stanley, February 1, 2010.

¹⁶ For a detailed discussion of tailored deterrence, see M. Elaine Bunn, *Can Deterrence Be Tailored?* Institute for National Strategic Studies Strategic Forum 225 (Washington, DC: National Defense University Press, January 2007).

¹⁷ General James Cartwright, testimony for the Senate Armed Services Committee Strategic Forces Subcommittee Hearing on Global Strike Plans and Programs in Review of the Defense Authorization Request for FY07, March 29, 2006.

¹⁸ Green, 6.

¹⁹ 2010 QDR Report, 31.

²⁰ *Ibid.*, 32.

²¹ James Miller, testimony for the Senate Foreign Relations Committee Hearing on the New START Treaty: Views from the Pentagon, June 16, 2010, 3–4, available at <<http://foreign.senate.gov/imo/media/doc/Miller,%20Dr.%20James%20N.pdf>>.

²² Green, 7; see also Payne, 3.

²³ Cartwright, March 29, 2006.

²⁴ General James Cartwright, Commander of U.S. Strategic Command, testimony for the Senate Armed Services Committee Strategic Forces Subcommittee Hearing on Strategic Forces Programs in Review of the Defense Authorization Request for FY08 and the Future Years Defense Program, March 28, 2007.

²⁵ *NPR Report*, 34.

²⁶ 2010 QDR Report, 33.

²⁷ For Obama administration description of CPGS as part of a larger family of long-range, nonnuclear strike assets, see Roberts, 4; see also James Miller, testimony for the House Armed Services Committee Hearing on U.S. Nuclear Weapons Policy and Force Structure, April 14, 2010.

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²⁹ Department of Defense Bloggers Roundtable with Bradley H. Roberts, Admiral John E. Roberti, Deputy Director for Strategy and Policy, J5, the Joint Staff; The Nuclear Posture Review, April 6, 2010, 12, available at <www.defense.gov/Blog_files/Blog?...as-sets/20100406_NPR_transcript.pdf>.

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³² *NPR Report*, 15–17, 21–24, 37–43.

³³ Arms Control Association, “Understanding New START and the Nuclear Posture Review,” April 9, 2010, available at <www.armscontrol.org/events/STARTandNPRBriefing>.

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³⁵ *Ibid.*, 27–51, for a full explanation of the study’s scenario-based analysis.

³⁶ *Ibid.*, 27–33.

³⁷ *Ibid.*, 43, note 10: “The committee recognized that the CTM proposal involves only two conventionally armed missiles per sub-

marine, and did not analyze or discuss in detail the issues that would arise from the deployment or use of larger deployments.”

³⁸ *Ibid.*, 47; see also 30, 41–42.

³⁹ *Ibid.*, 50; see 41–47 for a discussion of CPGS systems and the 15 capability metrics and 48–49 for a table summarizing the performance of the systems in the test cases.

⁴⁰ *Ibid.*, 51–55.

⁴¹ *Ibid.*, 86.

⁴² Bruce M. Sugden, “Speed Kills: Analyzing the Deployment of Conventional Ballistic Missiles,” *International Security* 34, no. 1 (Summer 2009), 124–141.

⁴³ For examples of this argument, see Bruce Sugden, Dinshaw Mistry, and Austin Long, “Going Nowhere Fast: Assessing Concerns about Long-Range Conventional Ballistic Missiles,” *International Security* 34, no. 4 (Spring 2010), 166–172; and Joshua Pollack, “Evaluating Conventional Prompt Global Strike,” *Bulletin of the Atomic Scientists* (January–February 2009), 15–18.

⁴⁴ Jack Reed, Floor Statement Opposing Sessions Amendment on the Trident Submarine, August 3, 2006, available at <<http://reed.senate.gov/newsroom/details.cfm?id=261473>>.

⁴⁵ Sugden, Mistry, and Long, 179–180.

⁴⁶ This hypothetical scenario is drawn from a more detailed one provided in Department of Defense, Report of the Defense Science Board Task Force on Time Critical Conventional Strike from Strategic Standoff (Washington, DC: Department of Defense, March 2009), 69–72, available at <www.acq.osd.mil/dsb/reports/ADA498403.pdf>.

⁴⁷ *U.S. Conventional Prompt Global Strike*, 67.

⁴⁸ For examples of near-peer ASAT attacks, see scenario 1 in *Report of the Defense Science Board Task Force on Time Critical Conventional Strike from Strategic Standoff*, 65–68. The scenario involves a near-peer competitor attack on a U.S. satellite as the United States is preparing to intervene in a conflict between the near peer and a U.S. ally; see also General Cartwright testimony, March 28, 2007. General Cartwright said that the United States needs a CPGS capability to respond to ASAT attacks; the comment was in the context of a discussion about China’s ASAT capabilities.

⁴⁹ For an example of this argument as it applies to states such as Iran and North Korea, see Sugden, Mistry, and Long, 170–171.

⁵⁰ See 2010 QDR Report, 31–34, for a discussion of how the United States plans to respond to the threat of aggression in anti-access environments. It lists expanded long-range strike capabilities and CPGS as one of eight force enhancements that will enable the United States to overcome antiaccess strategies.

⁵¹ Sugden, Mistry, and Long, 177.

⁵² This example is drawn from scenario 5 in *Report of the Defense Science Board Task Force on Time Critical Conventional Strike from Strategic Standoff*, 81–84. Also see Flory; he stated that Conventional Trident (CTM) D–5 missiles would probably possess the energy and accuracy to close the entrances and exits of a hard target. As noted earlier, the NRC study concluded that the initial CTM would be ineffective against hard targets with known vulnerabilities. Also see Sugden, 133. He suggests that CPGS attacks might “functionally disable” some hard and deeply buried targets.

⁵³ See Miller testimony, March 16, 2010, for a brief description of administration thinking on deterrence in space.

⁵⁴ Pollack, 19.

⁵⁵ *U.S. Conventional Prompt Global Strike*, 70.

⁵⁶ Cartwright, March 28, 2007.

⁵⁷ *NPR Report*, 6.

⁵⁸ *U.S. Conventional Prompt Global Strike*, 86.

⁵⁹ Miller, June 16, 2010, 3–4.

⁶⁰ We would like to thank Richard Davison of the National War College for his insight on this perspective.

⁶¹ Elaine M. Grossman, “Senior U.S. Official Doubt Conventional Global Strike Value,” *Global Security Newswire*, November 26, 2008, available at <http://www.globalsecuritynewswire.org/gsn/nw_20081126_9258.php>.

⁶² See Flory, 12; Green, 7; and Department of Defense, *Quadrennial Defense Review Report* (Washington, DC: Department of Defense, February 6, 2006), 50.

⁶³ See Amy F. Woolf, “Conventional Warheads for Long-Range Ballistic Missiles: Background and Issues for Congress,” Congressional Research Service, RL33067, January 26, 2009, 14–19, for an overview of funding for CTM during the Bush administration.

⁶⁴ Senator Levin during the Senate Armed Services Committee Hearing on the Quadrennial Defense Review, March 8, 2006.

⁶⁵ Letter to Dr. Ralph J. Cicerone, President of the National Academy of Sciences, from Senator Daniel K. Inouye and Ted Stevens, February 16, 2007. The letter is reprinted in National Research Council, *U.S. Conventional Prompt Global Strike*, Appendix B.

⁶⁶ Woolf, 18.

⁶⁷ For a more detailed description of the CSM concept, see Woolf, 11–14, and *U.S. Conventional Prompt Global Strike*, 113–115 and 144–145.

⁶⁸ Miller, June 16, 2010, 3–4.

⁶⁹ Sugden, 144.

⁷⁰ Department of Defense, *Fiscal Year 2011 Budget Estimate: Research, Development, Test, and Evaluations, Defense Wide Volume 3B, Office of the Secretary of Defense* (Washington, DC: Department of Defense, February 2010), 257–271.

⁷¹ *U.S. Conventional Prompt Global Strike*, 72.

⁷² *Ibid.*, 74–75.

⁷³ *Ibid.*, 76; also see Woolf, 23–24.

⁷⁴ Office of the Secretary of Defense, *Annual Report to Congress, Military and Security Developments Involving the People's Republic of China 2010* (Washington, DC: Department of Defense, August 2010), 34–35.

⁷⁵ *U.S. Conventional Prompt Global Strike*, 69, 76.

⁷⁶ Sugden, 121; Pollack, 19.

⁷⁷ *U.S. Conventional Prompt Global Strike*, 76.

⁷⁸ China does not currently possess a missile launch detection and early warning system. To avoid a “best case scenario analysis,” we assume that China will develop one in the near term.

⁷⁹ *U.S. Conventional Prompt Global Strike*, 72.

⁸⁰ See Robert M. Gates, testimony for the Senate Foreign Relations Committee Hearing on the New START Treaty, May 18, 2010,

3, available at <<http://foreign.senate.gov/imo/media/doc/GatesTestimony100518a.pdf>>.

⁸¹ *NPR Report*, 20–21; also see Department of State, Bureau of Verification, Compliance, and Implementation, “Conventional Prompt Global Strike Fact Sheet,” April 8, 2010, available at <www.state.gov/t/avc/rls/139913.htm>.

⁸² Keith B. Payne, testimony for the Senate Armed Services Committee Hearing on Independent Analysis of the New START Treaty, July 27, 2010, 2, available at <<http://armed-services.senate.gov/statemnt/2010/07%20July/Payne%2007-27-10.pdf>>.

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⁸⁴ Department of State, Bureau of Verification, Compliance, and Implementation, “Article-by-Article Analysis of the New START Treaty Documents,” May 5, 2010, 14, available at <www.state.gov/t/avc/trty/141829.htm>.

⁸⁵ Miller, June 16, 2010, 5.

⁸⁶ For New START’s formal definition of ballistic missiles, see the Protocol to the Treaty between the United States of America and the Russian Federation on Measures for the Further Reduction and Limitation of Strategic Offensive Arms, Part One, Paragraph 6.

⁸⁷ Eric S. Edelman, testimony for the Senate Foreign Relations Committee Hearing on the New START Treaty: Benefits and Risks, June 24, 2010, 6, available at <<http://foreign.senate.gov/imo/media/doc/Edelman,%20Hon.%20Eric%20S.pdf>>.

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⁸⁹ Article XIV, paragraph 2 of the New START Treaty.

⁹⁰ *Nuclear Posture Review Report*, 28.

⁹¹ *Ibid.*, 28.

⁹² General Kevin Chilton, testimony for the House Armed Service Committee Strategic Forces Subcommittee Hearing on Strategic Forces, March 16, 2010, 13, available at <http://armedservices.house.gov/pdfs/StratForces031610/Chilton_Testimony.pdf>.

⁹³ Craig Whitlock, “U.S. Looks to Non-Nuclear Weapons to Use as a Deterrent,” *The Washington Post*, April 8, 2010.

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