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Out of Sight Should Not Mean Out of Reach: Deterrence and the Proliferation of Hard and Deeply Buried Targets

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It has been almost two decades since the U.S. government had an extensive public discussion of the issue of having a nuclear capability to destroy hard and deeply buried targets (HDBTs). HDBTs can range from hardened surface bunkers to underground tunnels, with purposes that vary from protecting civilian and military leaders, weapons, industry personnel, and command, control, and communication nodes (among others). A majority of HDBTs are less than 250 meters deep but a few are as much as 500-700 meters deep in granite or limestone rock.¹ Many of these targets cannot be reliably held at risk by conventional weapons.

During the Cold War, the United States developed some capabilities to destroy HDBTs, particularly in the Warsaw Pact and the Soviet Union, but the 1990s brought concerns over newly-armed nuclear weapon states, especially North Korea (technically still at war with U.S. ally South Korea). Additionally, advancements in conventional precision munitions and their increased lethality drove countries like Iran and China to redouble their efforts to protect what they value by building deeper and more hardened bunkers.² U.S. efforts to improve its HDBT capabilities have not made significant progress since the 1990s when the B61 Mod 11 nuclear



weapon entered service. In the interim, adversaries have improved their hardening and tunneling capabilities. These developments likely diminish the U.S. ability to threaten what adversaries value most, which is an essential component of a credible deterrent posture.

Deterrence and Newly Armed Nuclear States

During much of the Cold War, the declared basis for nuclear deterrence was mutually assured destruction (MAD): a threat of retaliation so large that the Soviet Union would not possibly consider attacking the United States or allies.³ The concept, developed as a budget management tool during Secretary of Defense Robert McNamara's tenure,⁴ faced credibility challenges almost from the beginning because of doubts that a large-scale threat to Soviet society could be a reliable basis for deterrence in many plausible Soviet attack scenarios.⁵

The United States realized that societal threats alone (e.g., threatening "soft" unprotected targets like cities) were not adequate for credible deterrence, let alone consistent with the Just War Doctrine, and as technologies advanced, the United States developed means to threaten targets other than Soviet cities and industry. Embedded in this change was a recognition that the Soviet leadership might not place the same value as the United States on protecting its population centers compared to other assets. Therefore, to make deterrence credible, the United States needed to threaten what the Soviet leadership valued most – its power structure, its means of internal control, and its means of external attack, often protected in hardened shelters deep underground. By holding these assets at risk, the United States sought to strengthen deterrence by denying Soviet leaders the expectation that they could engage in aggression against the West at a tolerable cost – importantly, tolerable from the perspective of the Soviet leadership.

The nuclear arsenal evolved as technologies and enemy postures evolved and the responsiveness to both technological developments and enemy postures was an important component of U.S. deterrence credibility and allied assurance. But the United States did not strive for a first strike capability, and during much of the Cold War its nuclear policies remained largely consistent with the principle of MAD.⁶ But today's adversaries are nothing like the Soviet Union, and their decision-making processes, goals, and strategic cultures continue to be vastly different from those of the United States.

Since the end of the Cold War, the modernization of the U.S. nuclear arsenal has largely ceased and even modest initiatives to explore new warhead concepts have been opposed by Congress.⁷ The United States has prioritized stockpile sustainment and surveillance over modernization, even at the cost of foregoing safer, more robust nuclear warheads than those it deployed during the Cold War.⁸ Modifications to the existing stockpile have been minimal and generally related to warhead life extension efforts rather than providing new military capabilities.



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Meanwhile, deterrence dynamics became more complex with new nuclear-armed states whose approaches to deterrence were less familiar to the United States. Deterrence threats to their populations, in addition to being of dubious legal and moral standing, may not be credible and instead may lead to deterrence failure. Deterring adversaries from attacking the United States or allies may require the United States to hold at risk what they value, particularly targets that are hardened and deeply buried and inaccessible to conventional penetrators. Facilities deep underground, under the equivalent of several hundred feet of concrete, “conceal and protect an adversary’s most valued and strategic capabilities.”⁹ For deterrence, the United States must be able to credibly threaten these facilities and thereby deny opponents safe sanctuaries; hence the need for nuclear HDBT capabilities in addition to conventional earth penetrators.¹⁰

Nuclear HDBT weapons detonate after penetrating into the ground, thereby magnifying the amount of energy that is transmitted to the ground. The detonation results in a seismic shock wave that can damage HDBTs. As a 2005 National Research Council report notes, “The yield required of a nuclear weapon to destroy a hard and deeply buried target is reduced by a factor of 15 to 25 by enhanced ground-shock coupling if the weapon is detonated a few meters below the surface.”¹¹ All other things being equal, this yield reduction would likely reduce unintended collateral damage compared to a surface burst.

Technological developments of the past 30 years have undoubtedly improved methods of tunneling deeper and hardening at reduced costs. Meanwhile, U.S. HDBT capabilities that would allow the United States to hold at risk some of the hardest targets have not significantly advanced since the B61 Mod 11 weapon entered service in 1997. But even this weapon reportedly “cannot survive delivery into certain types of terrain in which such [hardened underground] facilities may be located.”¹²

The Robust Nuclear Earth Penetrator and the HDBT Debate

The last time the United States vigorously debated the issue of credibly threatening HDBTs was during the George W. Bush administration. The 2001 *Nuclear Posture Review* (NPR) raised the challenge of defeating HDBTs and called for new capabilities that could accomplish this goal.¹³ Similarly, the administration’s *Report to Congress on the Defeat of Hard and Deeply Buried Targets* highlighted the need for holding these types of targets at risk.¹⁴ Both the NPR and the report to Congress considered nuclear and conventional capabilities, although it was clear that conventional and even current U.S. nuclear capabilities were insufficient both in quality and quantity to defeat extremely hard and deeply buried targets.¹⁵

The effort to hold HDBTs at risk for credible deterrence led to the Robust Nuclear Earth Penetrator (RNEP) study in May 2003.¹⁶ It examined the feasibility of encasing B61 or B83 warheads in a hard shell that would help the warhead to penetrate the ground before detonating, therefore making it more effective against HDBTs. The RNEP was not about



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designing new nuclear warheads as the warhead's physics package would not be changed. It was also not an example of the United States pursuing a warfighting nuclear strategy or making nuclear weapons more usable.¹⁷ As a 2006 Defense Science Board Report pointed out: "The nature of the debate over RNEP tends to ignore a fundamental truth with respect to deterrence that is worth repeating: *weapons that are not seen as useable and effective by potential adversaries cannot be an effective, reliable deterrent.*"¹⁸

Remarkably, even a study of one of the potential solutions to the HDBT problem met with congressional resistance due to concerns it would presage the development of new, and supposedly more usable nuclear weapons. In fact, the RNEP debate illustrated the erosion of congressional expertise in nuclear issues and the administration's inability to communicate effectively as multiple narratives about various nuclear programs and initiatives became muddled together.¹⁹ Congress initially fully funded the Bush Administration's \$15 million request for the RNEP study in fiscal year (FY) 2003, halved the request to \$7.5 million in FY2004, and eliminated RNEP funding in FY2005.²⁰ The Bush administration, cognizant of Congressional opposition to the project, scaled the proposed study down to examine only the feasibility of the B83 warhead (instead of considering the B61 warhead as well) and requested \$4 million for the study in its FY2006 budget request.²¹ Congress provided no funding for the RNEP study and the National Nuclear Security Administration closed out the program in the FY2007 budget request.²² But Congress did fund a sled test in the Department of Defense's Hard and Deeply Buried Target Defeat System program element to assess conventional HDBT capabilities.²³ A sled test involved slamming a mock penetrator shell into a block of concrete at high speed to help the Departments of Defense and Energy understand how it would survive the impact to the ground and allow a warhead to discharge. An improved HDBT capability would permit the United States hold a wider range of HDBTs at risk and reverse the negative trend of U.S. adversaries having more, rather than fewer, sanctuaries.

HDBT Efforts Will Not Start an Arms Race

Any discussion of "new" nuclear capabilities in the United States will trigger accusations that the United States is starting an arms race, even if the capabilities in question are really not "new" because the United States deployed them in the past or was not the first to deploy them. Nuclear warheads are the only weapons in the U.S. arsenal on which the country spends billions of dollars a year *to keep functionally about the same*, even as geopolitical conditions and the threats facing the United States change dramatically. Unlike potential adversaries who have continued to modernize their nuclear forces since the end of the Cold War, the United States stopped all its nuclear weapon modernization programs for HDBTs. Nevertheless, the Russian Federation "claims to be developing new warhead designs for strategic systems, such as new high-yield and earth-penetrating warheads to attack hardened military targets."²⁴ A reference to Russia developing "low-yield tactical nuclear weapons including an earth penetrator" is contained in the 2009 report of the bipartisan Congressional Commission on the Strategic



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Posture of the United States.²⁵ Russia's efforts appear already to be well underway; therefore, the United States reconstituting capabilities to destroy today's more hardened and deeply buried targets cannot initiate an arms race.

Similarly, U.S. nonproliferation goals are unlikely to be impacted negatively by U.S. efforts to develop better HDBT capabilities. The 1972 Nonproliferation Treaty was signed when the United States had a very active and robust nuclear production complex and regularly introduced new warheads into the stockpile. In fact, the vigorousness and attention with which the United States maintained its nuclear stockpile undoubtedly played a role in U.S. allies foregoing nuclear capabilities of their own.

New nuclear-armed countries appeared after the United States ceased these activities and reduced the role of nuclear weapons in its national security strategy following the end of the Cold War. Countries make their own calculations about which programs they will pursue to advance their interests, and while U.S. programs may affect those decisions, they are just one variable among many that other countries consider when pursuing their programs. It is also worth keeping in mind that other countries' interests are often not compatible with those of the United States – especially when they consider the United States their adversary.

Conclusion

When the United States stopped developing and testing new nuclear weapons in the early 1990s, the world was a different place than it is today. Serious Great Power nuclear threats and conflicts of interest have reappeared in international relations. The U.S. nuclear arsenal must evolve to provide capabilities suited to best deter adversaries, including nuclear-armed states that have developed and deployed their nuclear weapon capabilities after the end of the Cold War and that protect what they value in hard and deeply buried bunkers. Congress should ensure that the United States has the HDBT capabilities now needed for deterrence.

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