



## WHY WE SHOULD STUDY DEVELOPING NUCLEAR EARTH PENETRATORS – AND WHY THEY ARE ACTUALLY STABILIZING

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With the ratification of the New START Treaty and the associated political commitments made by the Administration and Congress to modernize U.S. nuclear deterrent capabilities, attention is beginning to shift towards the shape of the future arsenal. Many questions remain: about the threats which we need to deter, about what we need to hold at risk in order to deter effectively, and about the size and nature of the arsenal needed to meet those requirements.

One of the most pressing questions is what the United States can and should do about the growing ability of its most plausible state adversaries, including North Korea and Iran,<sup>1</sup> to locate their most valued assets underground in facilities effectively immune from missile, air, or naval attack. Estimates of the number of such “hard and deeply buried targets” (HDBTs) have ranged from as low as 50 in North Korea and Iran to as high as 10,000 worldwide according to an influential study by the National Academy of Sciences, citing the U.S. Defense Intelligence Agency (both estimates in 2005).<sup>2</sup> While reliable numbers are unavailable in the unclassified realm (and most likely also in the classified, due to the extremely formidable challenges of correctly identifying such facilities and accurately ascertaining their characteristics), it seems reasonable to assume that the number of significantly hardened and buried facilities in countries of concern stands at least in the hundreds and very possibly in the thousands. In any case, what is essentially undisputed is that potential adversaries such as North Korea and Iran are increasingly able to locate or move their most valued assets to underground depths beyond the effective reach of U.S. action (assuming that the most deeply buried facilities would be reserved primarily for the most important assets).

This is because current U.S. earth penetration capabilities are insufficient to hold such facilities at risk. While the U.S. fields conventional earth penetrators, “many of the more important strategic hard and deeply buried targets are beyond the reach of conventional explosive penetrating weapons and can be held at risk of destruction only with nuclear weapons,”<sup>3</sup> as the 2005 National Academy panel reported. U.S. nuclear earth penetrator capabilities, on the other hand, are also limited, and U.S. Government officials have made clear that current U.S. nuclear weapons cannot penetrate to the depths required to hold at risk the most important HDBTs.<sup>4</sup>

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<sup>1</sup> See Christopher Ford, “Conventional ‘Replacement’ of Nuclear Weapons,” at <http://www.newparadigmsforum.com/NPFTestsites/?p=546>.

<sup>2</sup> For the low figure, see Jeffrey Lewis, “How Many Rogue State Hard and Deeply Buried Targets?” ArmsControlWonk.com, May 20, 2005, at <http://lewis.armscontrolwonk.com/archive/511/how-many-rogue-state-hard-and-deeply-buried-targets>. For the high figure, see National Research Council of the National Academies, Committee on the Effects of Nuclear Earth-Penetrator and Other Weapons, *Effects of Nuclear Earth-Penetrator and Other Weapons*, Washington, DC: National Academies Press, 2005, 14, available at [http://www.nap.edu/openbook.php?record\\_id=11282&page=14](http://www.nap.edu/openbook.php?record_id=11282&page=14).

<sup>3</sup> *Ibid.*, 1.

<sup>4</sup> Statement of Linton F. Brooks, Acting Under Secretary of Energy and Administrator for National Security, National Nuclear Security Administration, U.S. Department of Energy, before the Subcommittee on Strategic Forces, Senate Committee on Armed Services, April 8, 2003, at <http://armed-services.senate.gov/statemnt/2003/April/Brooks.pdf>.

## EARTH PENETRATING WEAPONS ARE NEEDED

This is a serious problem. The core of deterrence lies in being willing and able to destroy what your adversary most values. Bluntly, we need to be able to say credibly that “wherever you go, we can get at you.” If enemies can make themselves immune to retaliation, deterrence is seriously compromised. Yet the trend among our potential adversaries towards hiding underground, beyond the reach of our weaponry, poses precisely this challenge.

This burrowing underground might not be so severe a problem as to warrant developing nuclear earth penetrating weapons (EPW) if we could rely on our ground forces eventually to occupy and/or destroy bunkers. Thus the United States has for the last two decades relied on the threat of regime change and leadership accountability to deter WMD use by rogue states. Because these states have generally had comparatively limited WMD capabilities—and no nuclear weapons—and could not strike the U.S. homeland, this threat has been highly credible and quite effective. For example, in 1990-1991 the United States could rely not only on a response of massive retaliation, but also on threatening Saddam Hussein and the Ba’ath leadership with regime change and personal accountability if Iraqi forces used WMD against Coalition forces, a combined threat that sufficed to deter the Iraqis.

But this option is unlikely to be as feasible in the future. This is because key potential U.S. adversaries, such as North Korea and Iran, are today developing nuclear weapons and fielding survivable delivery systems, such as mobile ballistic missile systems, even as they are building more hardened and deeply buried facilities.<sup>5</sup> This combination of sanctuary and survivable striking power would allow these countries to hide or shield their most valued assets beyond the range of U.S. strikes while threatening the United States and its allies with survivable nuclear delivery systems. States so armed could shield their most valued assets from U.S. strikes while holding the threat of nuclear attack over Washington and allied capitals to deter any attempt to disarm them or occupy their countries. Facing the prospect of a nuclear strike in reaction to an attempt at occupation, a future President would not be in as strong a position to make a threat of the kind that Secretary of State Baker made to Tariq Aziz and the Iraqi leadership: if you use WMD against us, we will occupy your country and hold you personally accountable. Instead, if current trends continue, a country like North Korea will be able to place its most valued assets in sanctuary underground beyond the reach of our weaponry while ensuring, through survivable nuclear and WMD forces, that we cannot sensibly attempt occupation and regime change. This would mean that the leadership of such a country might enjoy a degree of effective immunity from U.S. reprisal.

Conversely, nuclear EPWs would be unnecessary if we could safely and with good conscience rely on only the threat to destroy unprotected cities and other soft targets to deter the North Koreans of the world. But the threat to confine ourselves to holding North Korean cities at risk in such a situation might well be ineffective in swaying a leader such as Kim Jong-II, whose sensitivity to losses among his own population when weighed against the preservation of his own rule should not be overestimated. Moreover, we might contemplate what Kim’s response would be were we to attack his cities when he might be hiding in a hardened bunker and his mobile nuclear forces were dispersed. In light of North Korea’s retaliatory capabilities, does the United States want to be forced to contemplate “trading” cities with a Kim Jong-II? Finally, it need hardly be stated that *confining* ourselves to the option of attacking an adversary’s cities would be, to say the least, morally troubling.

The capability to destroy HDBTs, on the other hand, would give the United States a more sensible option that would enable us to get at what our adversaries most value while avoiding the most serious pitfalls posed by occupation or attacks upon cities as such. Unlike either of these approaches, a formidable EPW capability would give us the assured ability to target an opponent wherever he chose to go, thus ensuring that he would never feel immune to our retaliation and so giving him the strongest incentive to moderate his own behavior. Even better, such a posture would strengthen our basic *pre-war* deterrent, since a potential adversary would know that he would always be vulnerable in a conflict with the United States. This would, of course, greatly increase the risks and potential costs of going to war with the United States and so lower the chances of war in the first place. This was why the United States, during the Cold War and especially starting with the Carter Administration, sought to develop the nuclear capabilities needed to hold at risk the hardened and deeply buried sites the Soviets were building in order to ensure that we could target the Soviet leadership wherever they might go—even after a Soviet first strike. It was the same logic applied to more contemporary threats that drove the Clinton Administration to generate the initial requirement for the controversial robust nuclear earth penetrator in the 1990s.

Of course, an effective strike on an HDBT would require accurate and timely intelligence, not only about the location and nature of the facility, but also about its contents. But the substantial difficulties of obtaining such intelligence would not undermine our fundamental *capability* to hold at risk an opponent in an HDBT, ensuring that an adversary would know that he would always be vulnerable to the exposure of his position—a well-grounded fear when the signatures associated with the operations and movements of a nation’s leadership are considered. Moreover, assuming substantial resolve on the part of the United States in the face of a grave attack, there would be no necessary time limitation on the acquisition of such intelligence.

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<sup>5</sup> See, e.g., Daniel A. Pinkston, *The North Korean Ballistic Missile Program*. Carlisle, PA: Strategic Studies Institute, <http://www.strategicstudiesinstitute.army.mil/pubs/display.cfm?pubID=842>, and, for Iran, <http://www.fas.org/programs/ssp/man/militarysumfolder/shahab-3.html>.

## **EARTH PENETRATORS ACTUALLY FOSTER STABILITY**

This deterrence requirement is relatively straightforward. Many criticisms of the development of nuclear EPWs, however, have focused on their allegedly destabilizing aspects, as in the opposition to the Bush Administration's controversial Robust Nuclear Earth Penetrator (RNEP) program.<sup>6</sup> Yet the truth is that such weapons would actually foster stability because they would reduce the incentives to strike early, before a window of opportunity passes, and because they would enable a retaliatory strike posture.

If strategic stability is given its traditional definition of weapons and postures that mitigate incentives to strike first and/or fast in a crisis and that reduce the probability of war, then earth penetrating weapons are not destabilizing. Quite the contrary. Because effective EPWs would enable the United States to hit an opponent *whenever and wherever* it chose to do so, they would minimize any pressures on the U.S. to strike in a perceived window of opportunity while an enemy or his valued asset was still aboveground or in a vulnerable underground facility. A principal reason to strike first is to take advantage of opportunities while they exist, opportunities such as the ability to take out an adversary's valued assets while they remain vulnerable to U.S. strikes. Think, for instance, of the pressures that a U.S. leader might face in a variant of the 2003 attempted decapitating strike against Saddam Hussein if the President thought there were a serious chance the opponent might use WMD—and then think of the response of the opponent in the wake of such a decapitation attempt. With EPW weapons, it would be less likely that a President would be boxed in by the hellish choice of “strike now, or lose the opportunity entirely” because there would be nowhere that an opponent could safely escape American action. An EPW capability would thus mitigate the window of opportunity quandary and so allow the President to wait, a vital component of stability. More broadly, an EPW capability would strengthen stability by giving U.S. decision-makers greater confidence in the general effectiveness of the American retaliatory capability, since there would be no sanctuary from it. This would give greater strength to the overall American deterrent, thereby lowering the probability of aggression against U.S. interests and war.

Another important consideration in the stability equation is the confidence that Russia and China have in the survivability and effectiveness of their retaliatory force in light of U.S. assets. U.S. capabilities that could help give the United States a disarming first strike capability could well encourage Moscow or Beijing to adopt far less deliberate launch postures, in turn increasing the possibilities of catastrophe. Yet EPWs would not add significant counterforce capability against Russia or China's retaliatory forces to the U.S. arsenal. Deployed mobile land or sea-based ballistic missiles as well as mobile or otherwise survivable command and control assets would not be more easily targeted because of an earth penetration capability. Thus the United States would not gain any added benefit from striking first in an attempt to disarm an opponent. Moreover, the United States could take additional steps to minimize disruptions in strategic relations with Moscow and Beijing; for instance, the United States might unilaterally commit to limiting the number of such weapons produced to limit their impact on strategic stability with Russia and China.

Finally, EPWs would not lower the “threshold” for nuclear use—a nuclear strike would remain the extraordinarily grave step that it is today. Indeed, the very fact that effective nuclear EPWs would necessarily be very “dirty” in terms of radioactive fallout would ensure that no President would authorize their use except in the gravest circumstances.<sup>7</sup>

## **EARTH PENETRATORS DO NOT NEED TO BE NUCLEAR, BUT NUCLEAR VARIANTS SHOULD NOT BE RULED OUT**

The requirement of deterrence with respect to HDBTs is that the United States needs to be able to hold at risk from afar whatever an opponent values, even if he goes deep underground. This does not perforce require that such capabilities be nuclear; indeed, the use of conventional weapons to disable or effectively destroy HDBTs by closing off airshafts, entrances, and other vulnerable points would of course be a preferable approach. U.S. opponents, however, are fully aware of these conventional capabilities and must be expected to anticipate U.S. attempts to close off tunnel entrances and ventilation systems and to adapt to such a threat by such measures as multiplying entrances/exits, airshafts, and communication links and by the use of decoys, among other tactics. Moreover, as the National Academy of Sciences report found, there are stark physical limitations on the destructive power of conventional munitions as earth penetrators. This means that, in order to defeat some HDBTs, especially the most hardened and valuable ones, the explosive power that only a nuclear weapon can provide might be required in order to destroy the facility. Indeed, even a nuclear earth penetrator strike might well need to be accompanied by conventional strikes to close off exits and/or to prepare the target area in advance of a laydown employment of more vulnerable types of nuclear EPWs, including those designed to burrow more deeply before detonating.

While the technical characteristics of an effective EPW capability should not be too sharply defined in advance, the key is that nuclear options for EPWs should not be excluded from serious consideration. Prudence dictates, therefore, that the U.S.

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<sup>6</sup> See, for instance, Daryl G. Kimball, “Replacement Nuclear Warheads? Buyer Beware,” *Arms Control Today*, May 2005, available at [http://www.armscontrol.org/act/2005\\_05/focus](http://www.armscontrol.org/act/2005_05/focus).

<sup>7</sup> See Chapter 6, “Human and Environmental Effects,” of the National Academies study for an analysis of the severe consequences of even a low-yield nuclear earth penetrator.

Government should carefully study the feasibility and utility of nuclear EPWs, specifically by ordering the National Laboratories to study the issue. One concrete step that Congress could take would be to allow the National Laboratories to conduct simulated “sled tests” to determine how a nuclear payload would operate against HDBTs. Congress in the FY2006 Defense Authorization Act prohibited the Laboratories from conducting such tests, in effect blocking off research into the nuclear option.<sup>8</sup>

In order to minimize any negative political repercussions associated with the development of a nuclear EPW, it could be based on existing weapons, especially the B-61 Mod-11 or the more powerful B-83 nuclear gravity bombs; indeed, some work has already been done in this direction.<sup>9</sup> Focusing initial nuclear EPW work on gravity bombs would also lessen concerns in Moscow and Beijing, as bombers are far less suitable as first strike weapons than are fast-flying ballistic missiles.<sup>10</sup> To further assuage concerns, modifications could be trammled to ensure that additional nuclear testing would not be required to certify the weapon while pursuing necessary hardening and other improvements.

## GETTING PAST THE POLITICS TO MAINTAIN DETERRENCE

The last time a study to look into a nuclear EPW was proposed, the idea fell victim to the political tempest surrounding the 2001 Nuclear Posture Review, the emphasis on preemption in the 2002 National Security Strategy, and the 2003 war against Iraq. A nuclear EPW ended up looking like a symbol and tool of aggression, preemption, and a policy of first strike. This was unfortunate, as it distorted the realities of the issue. An effective EPW capability—whether conventional, nuclear, or both—is crucial for deterrence and stability. Indeed, the requirement for such a capability is a logical deduction from the traditional American approach to nuclear policy, one that stretches back into the Cold War, when the United States initiated development of nuclear EPWs to ensure that the Soviet leadership could never feel immune from U.S. retaliation, and forward to the Clinton Administration’s decision to initiate work on a robust nuclear earth penetrator. Correctly couching consideration of a nuclear EPW in this context cannot but help to win it a fairer hearing.

Beyond debates about stability, however, critics of a nuclear EPW have also argued that the development by the United States of any new nuclear weapons capabilities would undermine nonproliferation efforts by exposing Washington to charges of hypocrisy. How, runs this line of argument, would the United States be able to ask non-nuclear weapons states to forswear pursuing their own nuclear arsenals—and support firm efforts to prevent others from acquiring them—if the United States is itself modernizing its arsenal? This debate touches on a much larger set of issues concerning why nations acquire nuclear weapons and the nature of the international system, but the essence of the problem with this critique is that it vastly overstates the influence that incremental U.S. nuclear policy decisions such as the one advocated here have on other nations’ calculus as to whether to obtain nuclear weapons of their own. Moreover, to the extent that there are concerns regarding the consequences of development of a nuclear EPW, the United States could mount a vigorous public diplomacy initiative to explain that the development was driven not by pursuit of a domineering, disarming capability but rather by the need to maintain an effective deterrent to preserve stability in light of changing conditions.

The question of how technically to develop a nuclear EPW while maintaining U.S. commitments to restraint presents another set of challenges. It is true that developing and deploying a nuclear EPW might require a change in the U.S. policy, as laid out in the 2010 Nuclear Posture Review, that the United States would not develop new nuclear warheads or pursue new military missions or new capabilities for nuclear weapons. Of course, if an effective nuclear EPW could be entirely based on existing systems, then no change in U.S. policy on nuclear weapons development would be entailed. (A nuclear EPW would not be a new capability because the existing B61-11 weapon is a penetrator.) But it is possible that, in order to field a credibly effective nuclear EPW, new capabilities might need to be pursued. For instance, if potential adversaries continue digging further underground, the United States will likely need to develop effective burrowing devices to “open the door” for follow-on weapons to couple their blasts more effectively to the target. This development would entail a change in national policy. Yet the change involved would be relatively modest, constituting an adaptation of the existing framework of deterrence to new technical and geostrategic realities rather than a basic change in our fundamental approach. More to the point, a rigid “no change” policy cannot be tenable if, as we must realize, nuclear deterrence will remain a cornerstone of our security for the foreseeable future. The instinct to keep nuclear competition in check is laudable, but this does not necessitate a straitjacket on adaptation, which is what a nuclear EPW would be.

Ultimately, deterrence remains the best way to avoid war while protecting our core interests. Deterrence rests on the ability

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<sup>8</sup> See the National Defense Authorization Act for Fiscal Year 2006, Report of the Committee on Armed Services of the House of Representatives, 463, available at [http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=109\\_cong\\_reports&docid=f:hr089.109.pdf](http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=109_cong_reports&docid=f:hr089.109.pdf). For an account of the history of the termination of RNEP, see Jeffrey Lewis, “NNSA Denies Axeing RNEP,” November 15, 2005, <http://lewis.armscontrolwonk.com/archive/855/nnsa-denies-dropping-rnep>.

<sup>9</sup> See “Robust Nuclear Earth Penetrator” at GlobalSecurity.com at <http://www.globalsecurity.org/wmd/systems/rnep.htm>.

<sup>10</sup> This would not be to exclude consideration of a nuclear EPW on a ballistic missile, but simply to investigate whether a gravity bomb option might be sufficient for deterrence and on technical grounds.

and the willingness to strike what one's opponent most values wherever they are—no matter how long it takes. Weapons, postures, and strategies that contribute to this ability are to be commended and pursued, even if they at first glance seem frightening, for it may be the very qualities that make them frightening that also make them effective, and therefore stabilizing.

## GLOSSARY OF TERMS

*Earth Penetrating Weapons:* A weapon designed to penetrate into soil, rock, concrete, or other material to deliver a weapon to a target buried in the earth.

*Hard and deeply buried targets:* Intentionally hardened and buried facilities used to conceal and protect a state's leaders, military and industrial personnel, weapons, equipment, and other assets and activities. Ranging from hardened, surface bunker complexes to tunnel facilities deep underground, HDBTs are typically large, complex, and well concealed, incorporating strong physical security, modern air defenses, protective siting, multifaceted communications, and other important features that make many of them able to survive attack by conventional weapons.

*Sled test:* A test platform that slides along rails designed to test equipment such as missiles and bombs for collection on a variety of characteristics, including results of impact.

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