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NUCLEAR HELL ON WHEELS
EXAMINING THE NEED FOR A MOBILE ICBM

by

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Biography

Lieutenant Colonel Matthew E. Dillow entered the Air Force in 1994 as a graduate of the Miami University Air Force ROTC program. He is a command missileer with over 200 alert tours in 3 variations of the Minuteman III Intercontinental Ballistic Missile weapon system. Following his initial combat crew tour, he served in a number of staff positions as an ICBM targeting and emergency action procedures expert. He then attended intermediate developmental education at Lawrence Livermore National Laboratory as an Air Force Fellow and served on the Air Staff at the Pentagon as the cruise missile program element monitor and the executive officer to the AF/A10. Following his Pentagon assignment, Lt Col Dillow was assigned to the 321st Missile Squadron and the 90th Operations Support Squadron as the Operations Officer and then took command of the 321st Missile Squadron at F.E. Warren AFB, Wyoming. Following his command tour, Lt Col Dillow served as the Chief, Senior Leader Management Division at Headquarters Air Force Global Strike Command. He is currently a student at the Air War College at Maxwell Air Force Base, Alabama.

Abstract

The 2010 Nuclear Posture Review calls upon the Department of Defense to examine alternate basing modes for the nation's land-based leg of the triad. The Nuclear Posture Review presumes that the survivability of mobile ICBMs may eliminate the paradox faced by the President when presented with indications of nuclear attack. Namely, the President must choose to "use or lose" silo-based ICBMs, resulting in an increased risk of miscalculation in a time-constrained environment. This paper examines the validity of this rationale in two attack scenarios, and concludes that the Nuclear Posture Review does not account for the vulnerability of the President and the nuclear command and control system in the face of a surprise attack. The final section of the paper examines the conditions that must be present in order to favor the fielding of a US mobile ICBM force. The first condition is a change in vulnerability of the SSBN force, causing its survivability to be questioned. The second condition is the emergence of a credible conventional threat to the US silo-based ICBM force. The third condition is a shift in US nuclear strategy from counterforce to countervalue, to include the adoption of a minimum credible deterrence posture. The fourth condition is increased risk of miscalculation in a launch on warning scenario, specifically a false warning event that degrades confidence in the US early warning system. Finally, a collapse of restraints imposed by current arms control agreements could spur an arms race, changing the level of acceptable vulnerability for the land-based leg of the triad.

And what the ICBM force gives to the President is the ability to respond promptly. I think that's still a valuable component of the range of alternatives that we could offer to the President . . . I think there's a big difference between a force that you can use promptly and one that you must use promptly. And I no longer see us in a scenario where we must use the ICBMs promptly.

General Robert Kehler, former Commander, US Strategic Command¹

Introduction

The United States is faced with the troubling prospect of recapitalizing its entire nuclear triad over the course of the next fifteen years. Secretary of Defense Chuck Hagel has reiterated a commitment to maintaining the land, sea and air-based legs of the nation's nuclear triad, and the Department of Defense and the Services are in the process of acquiring a new ballistic missile submarine and a new bomber.² As part of the acquisition process for a new Intercontinental Ballistic Missile (ICBM), the Air Force has asked for proposals that include alternate basing modes such as mobile ICBMs. The pundits interested in such things as nuclear force structure have ridiculed the notion of a mobile ICBM, based largely on its projected cost, the unwillingness of the American people to tolerate the presence of mobile nuclear weapon systems on their roads, and the mobile ICBM's lack of utility against current threats.³ While these arguments may have merit, they fail to address the fundamental issue underlying the reemergence of the mobile ICBM in the context of the nation's future nuclear force structure. The 2010 Nuclear Posture Review was explicit about the need to consider alternatives to silo basing for ICBMs, directing the Department of Defense to "explore new modes of ICBM basing that could enhance survivability and further reduce any incentives for prompt launch. Such an assessment will be part of the Department of Defense's study of possible replacements for the current ICBM force."⁴

RAND studied the cost of various options for replacing the Minuteman III ICBM, and the nation's budget woes and fiscal constraints have been written about extensively.⁵ This paper will not delve into the affordability of a mobile ICBM, nor will it question the need for a land-based leg of the nuclear triad. Additionally, the debate concerning the efficacy of nuclear deterrence as a strategy is not considered; there are reams of well-written and articulated thought about most aspects of this well-worn topic. Though by no means a certainty, it is assumed that the United States will accept the security and safety risk needed to field a mobile ICBM should the international security situation warrant such risk. In order to assess the validity of the Nuclear Posture Review's rationale, this paper dissects the risks and rewards of a mobile ICBM force in two attack scenarios, and argues that the Nuclear Posture Review does not account for the vulnerability of the President and the nuclear command and control system in the face of a surprise attack.

The final section of the paper examines the conditions that must be present in order to favor the fielding of a US mobile ICBM force.⁶ The first condition is a change in vulnerability of the SSBN force, causing its survivability to be questioned. The second condition is the emergence of a credible conventional threat to the US silo-based ICBM force. The third condition is a shift in US nuclear strategy from counterforce to countervalue, to include the adoption of a minimum credible deterrence posture. Finally, a collapse of restraints imposed by current arms control agreements could spur an arms race, changing the level of acceptable vulnerability for the land-based leg of the triad. Though certain conditions could favor the deployment of a US mobile ICBM force at some point in the future, the current state of the geo-strategic landscape does not support such an acquisition.

Attributes of an Effective Nuclear Force Structure

The Rationale Behind the Current Nuclear Triad

Defining and empirically defending the deterrence effectiveness of a specific number of nuclear warheads deployed on a particular mix of weapon systems is an exercise in futility. It is more valuable to determine the kinds of capabilities that are likely to increase the credibility of a nuclear threat to a potential adversary. The 2010 Nuclear Posture Review explicitly defines the strengths and weaknesses of each current leg of the nuclear triad, and the advantages each contributes. Nuclear-armed strategic submarines (SSBNs) are considered the most *survivable* nuclear weapon system in the US arsenal. When on patrol at sea, they assure a retaliatory capability unmatched by the other two legs of the triad. Bombers are widely considered the most *flexible* of the three legs of the triad. In the context of nuclear conflict, bombers can be used to counter a wide range of threats, are recallable, and are useful for signaling intent due to their visibility.⁷ The silo-based ICBM force is credited with *responsiveness*. The current ICBM alert posture, high availability rate and secure command and control ensure they are available for execution within very short timelines.⁸ Each leg of the triad provides some degree of flexibility, survivability and responsiveness, and when combined the nuclear triad as a whole provides a complementary force structure capable of providing the President with a range of options across a spectrum of nuclear scenarios. This complementary force structure also provides a degree of hedge against unanticipated challenges, such as surprise technological advances in anti-submarine warfare or undetected failures in one of the primary weapon systems. For example, the nuclear triad does not rely wholly on the submarine force for survivability; a generated bomber force also provides a degree of survivability.

The Contributions of a Mobile ICBM System to the Existing Triad

Ideally, any future nuclear weapon system acquired by the United States would maximize the attributes of flexibility, survivability and responsiveness. The same Nuclear Posture Review that directs the study of alternate basing modes for ICBMs also emphasizes the essential attributes of the nuclear triad and reaffirms the need for all three legs of the triad into the foreseeable future. "Retaining all three Triad legs will best maintain strategic stability at a reasonable cost, while hedging against technical problems or vulnerabilities."⁹ So what exactly would a mobile ICBM contribute to the existing capabilities of the Triad? Typically, a road-mobile ICBM remains in garrison until tensions merit dispersal to the countryside. The survivability of a mobile ICBM with this concept of operations depends heavily on adequate intelligence and warning. In other words, a mobile ICBM is more survivable than a silo-based ICBM given enough time to generate and disperse, but is less survivable in a normal day-to-day posture (presumably in an unhardened shelter on a base) than a silo-based ICBM.¹⁰ This understanding is key to the logic behind the Nuclear Posture Review, as the intent is to remove the time constraint associated with a "use or lose" weapon system such as a silo-based ICBM. Mobile ICBMs are more flexible than silo-based ICBMs, as their generation is visible and can be used to signal resolve, and they can be repositioned to avoid overflight of neutral nations and the dropping of expended downstages in populated areas. They could also be deployed near missile defense sites, thus improving survivability.¹¹ On the other hand, mobile ICBMs are not as responsive as silo-based ICBMs, since their mobility complicates command and control and there are more time-consuming steps to take to prepare them for launch.¹² Of course, a mobile ICBM is not as survivable as an SSBN, nor is it as flexible as a bomber, nor is it as responsive

as a silo-based ICBM. The mobile ICBM is a compromise between these three attributes, but it does not offer any clear advantages over other systems already residing in the current triad.

The potential positive attributes of a mobile ICBM must be considered in light of the impact of shifting away from a silo-based ICBM force. Due to current treaty limitations, the number of operationally deployed warheads is limited to a total of 1,550 on 700 delivery vehicles.¹³ If the deployment of a mobile ICBM is implemented in lieu of a silo-based ICBM force, the impact on the number of aimpoints presented to an adversary is dramatic.

As opposed to bombers and sea-based missiles, which are bundled into relatively few aimpoints and may be vulnerable to attack, the size, protectedness and dispersion of ICBMs makes them virtually impossible to destroy short of an all-out nuclear attack. In this way, ICBMs are "warhead sinks," theoretically less vulnerable and therefore a stronger deterrent to attack by adversaries. Because an ICBM force can only be crippled through a large and unmistakable nuclear attack, ICBMs provide greater clarity about when a country is under attack and who the attacker is.¹⁴

The elimination of the silo-based ICBM force greatly simplifies enemy targeting, reducing aimpoints from 425 (assuming 420 ICBMs) to 5 (3 bomber bases and 2 SSBN bases) to effectively nullify the US nuclear arsenal in a surprise attack.¹⁵ The quandary posed to adversaries by the silo-based ICBM is best understood in terms of "price to attack." If an adversary chooses to attack the United States, they must expend 2.1 warheads for every Minuteman III silo to ensure its destruction. Russia would have to expend 882 of its 1,550 operationally deployed warheads to destroy just 420 single-warhead silo-based US ICBMs.¹⁶ The price to attack thus discourages a first strike and increases stability. The price to attack a garrison-based (non-dispersed) mobile ICBM is 0.6 warheads expended for every warhead destroyed.¹⁷ In a crisis, an adversary may be incentivized to attack early and from a platform with less warning (such as an SSBN) in order to destroy the mobile ICBMs before they can be dispersed. Thus the mobile ICBM does not offer the stabilizing effect of a single warhead, silo-

based force of 420 Minuteman IIIs; this impact on stability must be carefully weighed when considering future force structure.

The Impact of Mobile ICBMs on Presidential Decision-making

The Nuclear Posture Review raises the concern that silo-based ICBMs constrain Presidential decision-making timelines in such a way as to increase the likelihood of miscalculation or mistake.¹⁸ Upon initial warning of an attack on the United States, the President must decide to use the silo-based ICBMs within a very short timeline in order to launch them before they are destroyed on the ground by the adversary's incoming attack. According to this line of thinking, the lack of survivability of silo-based ICBMs puts the President in an untenable position, forcing him or her to accept destruction of the ICBM force or launch the ICBMs in a retaliatory attack with imperfect information. The posited risk in this situation is that the President will launch a retaliatory attack based on false warning indications of attack or that a loss of warning capability altogether may precipitate an attack. There are an infinite number of possible scenarios to test this notion, but two are sufficient to illustrate and examine the risks.

Scenario: Increased Tensions Lead to Possible Nuclear Exchange

In this scenario, tensions between the United States and Russia have built up over time leading to a situation where a nuclear exchange becomes a serious possibility. Intelligence sources confirm the generation of Russian nuclear forces, and all signs point towards an imminent nuclear attack. In response, the United States has generated its nuclear forces to their highest state of readiness, dispersing bombers to increase survivability and ensuring the entire SSBN force is at sea and ready to respond to Presidential direction. The United States has taken

action to ensure the survivability of the President and has maximized survivable nuclear command and control capability (see "Alert weapons (generated)" in Table 1.)

Table 1. Nuclear force structure weapons load under New START

<i>System</i>	<i>Delivery vehicles</i>	<i>Total warheads</i>	<i>Alert weapons (day to day)</i>	<i>Alert weapons (generated)</i>
SSBN	240	1,070	713	1,070
ICBM	420	420	420	420
Bombers	60	60	0	60
Total	720	1,550	1,133	1,550

Adapted from Arms Control Association, "U.S. Strategic Nuclear Forces Under New START," Arms Control Today, July 2013.

Note: New START counts each bomber as one warhead, though bombers are capable of carrying more.

While in this posture, the President receives notification from the US early warning system that an attack on the United States has taken place, and nuclear detonation in the continental United States will occur in minutes. What are the President's choices and what are the consequences of those choices?

1. *The President chooses to launch a retaliatory strike immediately, fearing the destruction of less than one-third of the US nuclear force is imminent.* Risk: Faulty warning indications caused the President to initiate a nuclear strike when it was not warranted. Reward: The President is able to launch the entire US nuclear arsenal instead of just two-thirds of it, increasing the damage sustained by the adversary.

2. *The President does not launch an immediate retaliatory strike, choosing instead to absorb a possible impact, thus ensuring the warning indications were accurate and the nation is actually under attack.* Risk: the President loses the US ICBM force (at the favorable exchange rate of 882 adversary weapons for 420 US weapons.)¹⁹ Reward: The President eliminates the possibility that the warning indications were faulty and does not risk initiating a nuclear exchange instead of retaliating in response to attack.

Conclusion: Given the costs and benefits of the two courses of action available, the President can afford to absorb the attack and make a deliberate decision to retaliate against the adversary without the pressure suggested by the Nuclear Posture Review and others. If ICBMs are a "use or lose" weapon, losing them is an acceptable choice as long as US nuclear forces are generated and survivability of the other two legs of the triad is maximized; adequate retaliatory forces will be available. But what if US forces have not been generated and their survivability is in question?

Scenario: Unprovoked Nuclear Attack Without Warning

In this scenario, the United States is caught completely by surprise, with no intelligence or other warning that an attack is imminent. US nuclear forces are in a normal posture; bombers are not dispersed and one-third of the SSBN force is in port and unprotected.²⁰ The silo-based ICBM force is at its normal state of readiness, prepared to promptly respond to Presidential direction. The President is not in a survivable location, and the United States has not implemented its plans to ensure command and control of nuclear forces can be maintained in a nuclear environment. While in this posture, the President receives notification from the US early warning system that an attack on the United States has been initiated, and nuclear detonation in the continental United States will occur in minutes. What are the President's choices and what are the consequences of those choices?

1. The President chooses to launch a retaliatory strike immediately, fearing the destruction of half of the US nuclear force is imminent. Risk: Faulty warning indications caused the President to initiate a nuclear strike when it was not warranted. Reward: The President is able to launch 73% of the US nuclear arsenal (8 SSBNs with 713 warheads) on patrol plus 420 ICBMs (420

warheads) instead of less than 50% of it (8 SSBNs on patrol), increasing the damage sustained by the adversary.

2. *The President chooses not to launch an immediate retaliatory strike, choosing instead to absorb a possible impact, thus ensuring the warning indications were accurate and the nation is actually under attack.* Risk: the President loses the US ICBM force (at the favorable exchange rate of 882 adversary weapons for 420 US weapons), the SSBNs in port (4 of the 12 in the arsenal), and the entire nuclear bomber force.²¹ Additionally, the President himself does not survive the attack, nor do his successors. Finally, the nuclear command and control system is largely destroyed, having been caught in an unsurvivable state. Reward: The President eliminates the possibility that the warning indications were faulty and does not risk initiating a nuclear exchange instead of retaliating in response to attack.

Conclusion: In a "bolt out of the blue" scenario, the President has no good options. He must risk the destruction of half of the nuclear arsenal, his own survival, and the capability to retaliate to ensure the warning indications are accurate, or he must risk launching an attack based on faulty warning indications. The "use or lose" nature of the silo-based ICBM force certainly contributes to this quandary, but it is not the only source. In the day-to-day nuclear posture of the United States, a total of eight SSBNs are on patrol at any one time.²² They constitute the entirety of the US survivable retaliatory capability, loaded with 713 warheads on 160 missiles. The remaining nuclear US forces are vulnerable to a first strike, including 60 bombers, the remaining 4 SSBNs (total of 357 warheads) and 420 ICBMs (420 warheads).²³ In fact, the President himself becomes a "use or lose" component of the command and control system, and the impending decapitation of the US government imposes its own sense of urgency on the decision-making process. The in-port SSBNs and the bomber force impose no pressure on

Presidential decision-making because there is no option to use them; they are not "use or lose" but are simply "lose" weapons in this scenario. The silo-based ICBM force simply gives the President an additional option to retaliate in a "bolt out of the blue" situation, an option only otherwise offered by SSBNs on patrol.

Nuclear Posture Review Rationale: An Assessment

The Nuclear Posture Review asks the Department of Defense to consider alternate basing modes for ICBMs in order to reduce the pressure on the President to launch on warning and thus reduce the likelihood of a miscalculation.²⁴ In light of the two scenarios examined above, what are the benefits of fielding a mobile ICBM to Presidential decision-making timelines? In the first scenario, it is clear that the rational choice is to absorb the attack. A mobile ICBM force would likely be dispersed and relatively survivable in such a scenario, and there is no reason to launch on warning. A dispersed mobile ICBM force does not change the decision the President will make to absorb the attack; it merely changes the number of weapons available to him for a retaliatory response (presumably all 1,550 warheads versus 1,130.) In the second scenario, the mobile ICBMs are unlikely to be dispersed and will be caught in garrison. The lack of survivability of mobile ICBMs in garrison pose the same "use or lose" quandary they were acquired to avoid; they offer no benefit whatsoever (see Table 2.)

Table 2. New START nuclear force structure with garrison-based mobile ICBM

<i>System</i>	<i>Delivery vehicles</i>	<i>Total warheads</i>	<i>Alert weapons (day to day)</i>	<i>Alert weapons (generated)</i>
SSBN	240	1,070	713	1,070
ICBM	420	420	0	420
Bombers	60	60	0	60
Total	720	1,550	713	1,550

Adapted from Arms Control Association, "U.S. Strategic Nuclear Forces Under New START," Arms Control Today, July 2013.

Note: New START counts each bomber as one warhead, though bombers are capable of carrying more.

Only mobile ICBMs that are dispersed *at all times* offer increased survivability in this scenario.²⁵ Assuming the United States fields a mobile ICBM that is dispersed and moving about regularly on a constant, 24-hour basis, the President can choose to absorb a bolt out of the blue attack, taking comfort in the fact that he will now have 1,133 survivable weapons at his disposal instead of just the 713 warheads available from the SSBNs on patrol (see Table 3.)

Table 3. New START nuclear force structure with constantly dispersed mobile ICBM

<i>System</i>	<i>Delivery vehicles</i>	<i>Total warheads</i>	<i>Alert weapons (day to day)</i>	<i>Alert weapons (generated)</i>
SSBN	240	1,070	713	1,070
ICBM	420	420	420	420
Bombers	60	60	0	60
Total	720	1,550	1,133	1,550

Adapted from Arms Control Association, "U.S. Strategic Nuclear Forces Under New START," Arms Control Today, July 2013.

Note: New START counts each bomber as one warhead, though bombers are capable of carrying more.

The mobile ICBM force does not, however, protect the President and his successor from the decapitating attack on leadership that will inevitably accompany a surprise attack by a peer, and does nothing to ensure the ability of the nation's leaders to direct a retaliatory attack. In other words, the President remains a "use or lose" component constraining decision-making timelines, despite the increased survivability of a mobile ICBM versus a silo-based ICBM.²⁶

The benefit of a constantly dispersed mobile ICBM force to decision-making timelines is thus most pronounced in a surprise attack scenario, but should the United States base nuclear force structure decisions for the future based on this benefit? The 2010 Nuclear Posture Review offers some insight. "First and foremost, the Soviet Union and the Warsaw Pact are gone. Russia is not an enemy, and is increasingly a partner in confronting proliferation and other emerging threats."²⁷ The 2010 Nuclear Posture Review goes on to say, "While we must maintain stable deterrence with major nuclear powers, the likelihood of major nuclear war has

declined significantly; thus far fewer nuclear weapons are needed to meet our traditional deterrence and reassurance goals."²⁸ If the only country with a nuclear arsenal capable of launching a first strike against the United States without warning is no longer an enemy and the likelihood of major nuclear war has in fact declined significantly, the rationale for acquiring a mobile ICBM that is most effective in a surprise, all-out nuclear attack from Russia correspondingly diminishes. The SSBN force is heralded as the indispensable leg of the nuclear triad due to its survivability, but the only situation where survivability is in question is dismissed as "much diminished."²⁹ Admittedly, recent developments in the Ukraine have since tarnished the relationship between Russia and the West, but sacrificing the stability offered by silo-based ICBMs to acquire a less stabilizing system that provides unneeded additional retaliatory capability is ill advised.

Conditions Favoring a Mobile ICBM Force

With an understanding of the role mobile ICBMs play in the nuclear force structures of other nations, it is key to define the circumstances that would favor the fielding of a US mobile ICBM system. In the discussion below, it is assumed that the United States maintains its commitment to fielding all three legs of the current nuclear triad.

1. If the survivability of the US SSBN fleet is called into question, a mobile ICBM system could be a viable, survivable alternative. As previously discussed, survivability is a quality vital to the effectiveness of the US nuclear triad. The United States currently relies on the survivability of the SSBN leg of the triad at sea for its entire retaliatory capability on a day-to-day basis. The 2010 Nuclear Posture Review raises no concerns about emerging threats to SSBN survivability, stating, "Today, there appears to be no viable near or mid-term threats to the survivability of US SSBNs" while admitting that such threats could emerge over the long term.³⁰ Presumably, an

emerging long-term threat would afford the United States ample opportunity to develop and acquire survivable nuclear force structure alternatives such as a mobile ICBM.

2. If US silo-based ICBMs are threatened by an adversary's conventional capability, a mobile ICBM could be a reasonable addition to nuclear force structure. US conventional superiority and emerging capability is a motivation for other nations to field mobile ICBMs. Their rationale is clear; the fact that the United States can destroy an adversary's nuclear forces without crossing the nuclear threshold or expending any of its own nuclear weapons is a frightening prospect. To counter this threat, a mobile ICBM force is preferable to a static, vulnerable silo-based force. The complicated nature of hunting down and destroying mobile missiles was clearly demonstrated during the first Gulf War, when the United States devoted hundreds of aircraft sorties to finding Iraqi SCUD missile launchers in unchallenging terrain without any discernible success.³¹ It remains a fact that mobile missile launchers are excruciatingly difficult to find, fix, target and destroy, and countries with mobile ICBM forces use this to their advantage. Russia has gone so far as to admit that they are considering fielding a rail-mobile ICBM system based on the threat posed by the US Prompt Global Strike conventionally armed ballistic missile to Russian silo-based ICBMs.³² The US silo-based ICBM force faces no comparable conventional threat in the foreseeable future; a change to this threat assessment could justify a shift from silo-based to mobile ICBMs.

3. If the United States adopts a countervalue or minimum credible deterrence nuclear strategy, the survivability of a mobile ICBM force would better meet the need for a secure second strike than a silo-based force. Silo-based ICBMs are a first strike or immediate retaliatory strike weapon, best suited to striking an adversary's military forces before they can be employed against the United States. As previously discussed, a strategy of minimum credible deterrence

adopts a "no first use" policy and seeks to maintain a secure retaliatory capability, largely by targeting population centers. As the United States has not employed a countervalue strategy (targeting cities versus military forces) since the Kennedy Administration, it seems unlikely that US adoption of a minimum credible deterrence approach is imminent.³³ Further deep cuts in the US arsenal (whether unilateral or a result of arms control agreements) could force the United States to consider such a strategy. The fewer operationally deployed warheads available to nuclear war planners, the less likely it is that they will be able to hold an adversary's nuclear forces at risk. If the United States has no hope of destroying these enemy nuclear forces with a hypothetically smaller arsenal, an alternative deterrence strategy emphasizing retaliation against population centers must be considered. Should the intent of the Global Zero Initiative be incrementally realized over a long period of time, the fielding of a US mobile ICBM force (with its assured second strike capability) could become a reality.³⁴

4. If the international arms control regime fails and an arms race reignites, the fielding of a mobile ICBM force could be to the advantage of the United States. An unbridled arms race would negate the stability offered by the "price to attack" silo-based ICBMs, and a mobile ICBM force would offer additional survivability for the land-based leg of the nuclear triad. With an unconstrained arsenal, the vulnerability of the silo-based ICBM forces could provide incentive for a first strike from a peer nuclear power, and the second strike capability of the SSBN force and a mobile ICBM force could prove to be a decisive deterrent. It is unlikely that the entire arms control relationship built up over the years with Russia will collapse anytime soon, but the possibility cannot be dismissed out of hand. The United States recently accused Russia of violating the terms of the Intermediate-Range Nuclear Forces (INF) Treaty by testing a ground-launched cruise missile. Among the range of options under consideration by the

United States to this violation is the fielding of a ground-launched cruise missile in Europe. Brian McKeon, Deputy Undersecretary of Defense for Policy, stated that the range of options under consideration ranged from "reactive defense, to counterforce, to counter value defense measures."³⁵ These statements are unlikely to be anything other than posturing, but they do indicate that the long-term sustainment of arms control agreements requires two partners, each willing to live up to their end of the bargain. US withdrawal from the Anti-Ballistic Missile Treaty in 2002 was a prime example of a nation terminating a treaty when it no longer serves its national interest; Russia could make the same calculation with regard to its current nuclear arms control agreements.³⁶ If this were to happen and unconstrained weapons buildups became the norm, a US mobile ICBM force could offer a survivable system that could serve as a hedge against failure of the SSBN force.

Conclusion

Current international threat conditions do not support the fielding of a US mobile ICBM force. The nuclear triad as it exists today provides the right mix of survivability, flexibility and responsiveness necessary to support a counterforce strategy and present a full range of options to the President in the most likely postulated scenarios. The pressure exerted by the "use or lose" nature of silo-based ICBMs in a massive surprise nuclear attack are not unique to that leg of the triad; the President and the nuclear command and control system are also unlikely to survive such an attack. The 2010 Nuclear Posture Review thus overestimates the impact of silo-based ICBMs on Presidential decision-making in a time constrained environment by affording too much credence to the likelihood of a surprise attack on a massive scale and by failing to appreciate the vulnerability of other elements of the nation's nuclear command and control system. The risk of losing silo-based ICBMs in such a scenario is more than offset by the

stability offered by the "price to attack" of such weapons and the role they play in altering an adversary's decision-making before initiating an attack.

Certain factors, though not currently compelling, could motivate the United States to more carefully consider the acquisition of a mobile ICBM force. If the survivability of SSBNs is called into question due to a technological breakthrough in anti-submarine warfare, mobile ICBMs would offer an important redundant hedge for ensuring an assured second strike. If the US silo-based ICBM force is threatened by an unforeseen conventional threat (such as an advanced stealth bomber or a highly accurate, conventional ballistic missile with sophisticated countermeasures), a mobile ICBM would reduce the risk that a non-nuclear attack could be used to degrade the nuclear deterrent. If the United States adopts a countervalue strategy such as minimum credible deterrence, the survivability of a mobile ICBM would better support the strategy's reliance on retaliation by a survivable weapon system. Finally, if an arms race reignites between the United States and Russia, the stability offered by US silo-based forces may be outweighed by the incentive to attack these vulnerable weapons with a first strike. In this situation, a constantly dispersed mobile ICBM force offers greater survivability and increases stability.

A note of caution must accompany these caveats, preconditions and assumptions. Mobile ICBMs present their own technological, doctrinal and operational challenges, and the United States has never fielded a true mobile ICBM system. Such a system cannot be designed, tested, acquired and implemented overnight, and the United States would be wise to reassess its need for such a system on a regular basis. The conditions that would shift the calculus in favor of a mobile ICBM can change overnight, but the process of developing a mobile force takes much more time. The strategic environment rarely favors the unprepared.

Notes

¹ The Center for Arms Control and Proliferation, "Quote of the Day: The Triad (Specifically ICBMs) Makes Sense (For Now) Edition"

<http://nukesofhazardblog.com/story/2012/7/19/111132/760> (accessed 12 Dec 2014)

² Chuck Hagel, "Remarks by Secretary Hagel at the University of Nebraska at Omaha"

<http://www.defense.gov/transcripts/transcript.aspx?transcriptid=5260> (accessed 4 Dec 2014)

³ Tom Z. Collina and Jacob Marx, "The Last Thing the US Needs are Mobile Nuclear Missiles," Defense One, 12 Nov 2014, <http://www.defenseone.com/ideas/2014/11/last-thing-us-needs-are-mobile-nuclear-missiles/98828/?oref=d-skybox> (accessed 28 Nov 2014)

⁴ Department of Defense, *Nuclear Posture Review Report*, April 2010, 27.

[http://www.defense.gov/npr/docs/2010 Nuclear Posture Review Report.pdf](http://www.defense.gov/npr/docs/2010%20Nuclear%20Posture%20Review%20Report.pdf)

⁵ Lauren Caston et al, "The Future of the U.S. Intercontinental Ballistic Missile Force," RAND Corporation, 2014, 107. <http://www.rand.org/pubs/monographs/MG1210.html> (accessed 12 Dec 2014)

⁶ Four countries currently possess nuclear-armed ICBMs: the United States, Russia, China and India (Pakistan does not currently have a ballistic missile capability with intercontinental range of 5,500+ kms.) Of those four, Russia, China and India have all chosen to field mobile ICBM systems. The most obvious rationale for fielding a mobile ICBM is to increase survivability and assure a retaliatory capability. When a nation's nuclear arsenal is small, that nation cannot afford to absorb an attack that will destroy a significant portion of its deterrent force. Mobile ICBMs rely on technology that is mature and relatively affordable (truck and rail technology is not complex nor expensive.) In contrast, procuring and perfecting nuclear-armed ballistic missiles launched from a submarine is expensive, technologically complex, and, once fielded, vulnerable to anti-submarine warfare efforts of more militarily advanced nations. In addition to the advantages in survivability that can be generally realized with a mobile ICBM, each of the three nations who have fielded them has its own unique reasons for doing so. Russia has expressed concerns about the emergence of a US prompt global strike weapon system that could hold portions of their nuclear arsenal at risk. Mobile ICBMs mitigate the risk that the United States could destroy a portion of the Russian silo-based ICBM force without expending any of its treaty-constrained nuclear forces. Prompt global strike is thus a destabilizing factor, driving the Russians to counter the capability by replacing silo-based ICBMs with less stabilizing mobile ICBMs. Mobile ICBMs give the Russians an affordable, survivable hedge against their fears of a technological or operational failure in their ballistic submarine force. In contrast to the Russia's motivation for fielding a rail-mobile ICBM, China and India's fielding of mobile systems is grounded in their nuclear strategy. China and India have both openly declared a "no first use" policy, and the small size of their arsenals indicates they have likely adopted a minimum credible deterrent policy. Minimum credible deterrence is a countervalue strategy that eschews first use of nuclear weapons. Instead, this strategy requires an arsenal no larger than necessary to hold just enough of the adversary's population and economy at risk in a retaliatory strike to deter them. Minimum credible deterrence puts a premium on the survivability of the nuclear arsenal, and the responsiveness of a silo-based

ICBM force holds little value in light of this approach. Both India and China are in the process of procuring a nascent submarine launched ballistic missile capability, but in the meantime they have invested in a mobile ICBM force that poses fewer technological challenges and lower costs. See Andrew Feickert, "Missile Survey; Ballistic and Cruise Missiles of Foreign Countries," Congressional Research Service, 5 Mar 2004, 2, 27-29.

<http://www.au.af.mil/au/awc/awcgate/crs/rl30427.pdf> (accessed 4 Dec 2014); Ankit Panda, "US Prompt Global Strike Missiles Prompt Russian Rail-Mounted ICBMs," *The Diplomat*, 19 Dec 2013. <http://thediplomat.com/2013/12/us-prompt-global-strike-missiles-prompt-russian-rail-mounted-icbms/> (accessed 12 Dec 2014); "China Reaffirms 'No First Use' Deterrent Policy," *Global Security Newswire*, 31 Mar 2011. <http://www.nti.org/gsn/article/china-reaffirms-no-first-use-deterrent-policy/> (accessed 12 Dec 2014); "India Ready for Nuclear No First Use Agreements," *The Times of India*, 22 Oct 2014.

<http://timesofindia.indiatimes.com/india/India-ready-for-a-nuclear-no-first-use-agreements/articleshow/44906401.cms> (accessed 4 Dec 2014); Hans M. Kristensen, Robert Norris, and Ivan Oelrich, "From Counterforce to Minimal Deterrence: A New Nuclear Policy on the Path Toward Eliminating Nuclear Weapons," Federation of American Scientists and the Natural Resources Defense Council, Occasional Paper No. 7, April 2009, 21.

http://www.fas.org/pubs/_docs/occasionalpaper7.pdf (accessed 4 Dec 2014); Rakesh Sood, "Should India Revise its Nuclear Doctrine?" Asia Pacific leadership Network for Nuclear Non-Proliferation and Disarmament and the Centre for Nuclear Non-Proliferation and Disarmament, Policy Brief No. 18, Dec 2014, 7,9. [http://www.a-pln.org/sites/default/files/apln-analysis-docs/Policy Brief No 18 - Should India Revise its Nuclear Doctrine.pdf](http://www.a-pln.org/sites/default/files/apln-analysis-docs/Policy%20Brief%20No%2018%20-%20Should%20India%20Revise%20its%20Nuclear%20Doctrine.pdf) (accessed 12 Dec 2014)

⁷ Department of Defense, *Nuclear Posture Review Report*, 22.

⁸ *Ibid.*, 23.

⁹ *Ibid.*, 21.

¹⁰ Art Hobson, "The ICBM Basing Question," *Science and Global Security*, Volume 2, 1991, 158.

¹¹ Caston et al, "Future of U.S. ICBM Force," 61.

¹² Office of the Deputy Under Secretary of Defense for Research and Engineering (Strategic and Space Systems,) "ICBM Basing Options; A Summary of Major Studies to Define a Survivable Basing Concept for ICBMs," Dec 1980, 65.

¹³ Department of State, "The New START Treaty," 22 Oct 2013. <http://www.state.gov/t/avc/rls/215726.htm> (accessed 21 Nov 2014)

¹⁴ Kingston Reif, Travis Sharp, Kirk Bansak, "Pruning the Nuclear Triad? The Pros and Cons of Submarines, Bombers, and Missiles," The Center for Arms Control and Non-Proliferation, 16 May 2013. http://armscontrolcenter.org/publications/factsheets/051613_nuclear_triad_pros_cons/ (accessed 4 Dec 2014)

¹⁵ Baker Spring and Michaela Bendikova, "Time to Modernize and Revitalize the Nuclear Triad," *The Heritage Foundation: Leadership for America*, 27 Jan 2012, 5. http://thf_media.s3.amazonaws.com/2012/pdf/bg2646.pdf (accessed 21 Jan 2015)

¹⁶ The ratio of warheads expended to warheads destroyed takes into account the survivability and hardness of current US silos, the yield of notional attacking ICBMs (475 kilotons), and assumes 90 percent reliability and 200 meter circular error probable for attacking ICBMs. See Hobson, "ICBM Basing Question," 158, 183.

¹⁷ The price to attack garrison-based mobile ICBMs is roughly equivalent to that of non-dispersed bombers. The price to attack dispersed land-mobile ICBMs ranges from 2.6 to 8.0 depending on the characteristics of the land-mobile system and amount of warning received. See Hobson, "ICBM Basing Question," 157-158.

¹⁸ Department of Defense, *Nuclear Posture Review Report*, 26.

¹⁹ Hobson, "ICBM Basing Question," 158.

²⁰ Richard Mies, "The SSBN in National Security," *Undersea Warfare*, Volume 2, Number 1, Fall 1999. http://www.navy.mil/navydata/cno/n87/usw/issue_5/ntlsecurity.html (accessed 15 Nov 2014)

²¹ See Hobson, "ICBM Basing Question," 158; Mies, "SSBN in National Security."

²² Ibid.

²³ The total number of warheads is based on treaty counting rules, which only count bombers a single system regardless of the number of warheads/bombs/cruise missiles loaded. See Department of Defense, "Fact Sheet on U.S. Nuclear Force Structure under the New Start Treaty." <http://www.defense.gov/documents/Fact-Sheet-on-US-Nuclear-Force-Structure-under-the-New-START-Treaty.pdf> (accessed 2 Dec 2014)

²⁴ Department of Defense, *Nuclear Posture Review Report*, 26.

²⁵ Hobson, "ICBM Basing Question," 161.

²⁶ Scott D. Sagan, *Moving Targets: Nuclear Strategy and National Security* (Princeton, New Jersey; Princeton University Press, 1990), 118.

²⁷ Department of Defense, *Nuclear Posture Review Report*, 15.

²⁸ Ibid., 45.

²⁹ Ibid.

³⁰ Department of Defense, *Nuclear Posture Review Report*, 22.

³¹ William Rosenau, *Special Operations Forces and Elusive Enemy Ground Targets; Lessons from Vietnam and the Persian Gulf War* (RAND Corporation, 2001), 33. https://www.rand.org/content/dam/rand/pubs/monograph_reports/MR1408/MR1408.ch3.pdf (accessed 12 Dec 2014)

³² Panda, "US Missiles Prompt Rail-Mounted ICBMs."

³³ Sagan, *Moving Targets*, 32.

³⁴ Dr. Jacques Attali et al, "Global Zero Action Plan," February 2010, 3. http://www.globalzero.org/files/gzap_6.0.pdf (accessed 4 Dec 2014)

³⁵ Bill Gertz, "Pentagon Considering Deployment of Nuclear Missiles in Europe," *The Washington Free Beacon*, 11 Dec 2014. <http://freebeacon.com/national-security/pentagon-considering-deployment-of-nuclear-missiles-in-europe/> (accessed 12 Dec 2014)

³⁶ Terrence Neilan, "Bush Pulls Out of ABM Treaty; Putin Calls Move a Mistake," *The New York Times*, 13 Dec 2001. <http://www.nytimes.com/2001/12/13/international/13CND-BUSH.html> (accessed 12 Dec 2014)



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