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Foreword

I originally wrote this primer on U.S. nuclear deterrence nearly seven years ago as a means to educate the public on the importance of this enterprise, which is critical to our existential interests. While much has changed in the global landscape over that time, one thing, unfortunately, has not: U.S. nuclear forces have not been fully reconstituted and remain unmodernized. Some steps toward progress have been made, namely the amazing progress on the B-21 Raider program and the LGM-35A Sentinel ICBM Ground Based Strategic Deterrent program. It is imperative now these programs receive the support and resources they require to succeed, as they cannot falter—this is a no-fail mission.

It is my hope that this primer, with a few updates, continues to help educate on the importance of nuclear deterrence, as it underpins not only our national security, but global security for all nations.

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On U.S. Nuclear Deterrence

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Introduction

Many Americans and some in the U.S. military will never have the opportunity to be educated on the nuclear deterrent—will not ever find time to ponder why we have it or to understand what its utility is today and in the future. However, understanding the essence of nuclear deterrence is important regardless of one's military service, branch, or career field because nuclear weapons are the ultimate guarantor of U.S. military power and security, and understanding how they fulfill this role should be fundamental to any practitioner of the profession of arms.

Unfortunately, since the end of the Cold War, along with the dramatic reduction in the U.S. nuclear weapons stockpile, the deterioration of the infrastructure to support the remaining stockpile, and the aging of the delivery systems that constitute the triad, there has been a dearth of attention paid to the rationale for the nuclear deterrent. The underlying principles and rationale for the deterrent have not gone away, but we have stopped educating, thinking, and debating, with informed underpinnings, the necessity and role of the U.S. nuclear deterrent in today's world. Even more concerning has been the lack of informed debate on the subject. We have raised three generations of Air Force officers who may not have been exposed to the most fundamental and yet relevant arguments surrounding deterrence from the late nuclear theorists Herman Kahn and Thomas Schelling.

When you stop thinking about something, typically what follows is you stop investing in it. When you stop investing in it, the people expected to perform the mission lose focus, morale declines, and some bad things can happen, such as the unintentional movement of nuclear weapons from Minot Air Force Base to Barksdale Air Force Base in 2007.[1] It is hard to imagine that the series of failures that led up to this event could ever have happened during the Cold War given the intense focus the Air Force had on the nuclear mission. But, as a former commander of Strategic Air Command observed when referring to this incident, the unintentional movement was probably

Figure 1: The B-52 Stratofortress, an enduring symbol of the air-breathing leg of the U.S. nuclear triad.
Credit: U.S. Air Force photo by Airman 1st Class Zachary Wright

the best thing that could have happened to the U.S. nuclear deterrent. Nobody died, nobody got hurt, and control of the weapons was maintained, but the incident provided a much-needed wake-up call that we had stopped paying attention to something still very relevant and still very important to the defense of the United States and the stability of the world.

Of course, context matters. The collapse of the Soviet Union and the confident expectation of a new relationship with Russia dominated in the 1990s. The context post-9/11 further contributed to the lack of attention. Our focus changed to terrorism, and it remains a concern today. Seven years later in 2008, a foundational strategy document, the *Joint Operations Environment* (JOE), was drafted to assess the environment in which our military could be expected to operate in the future and to posit the highest priority threats our military would face. The number one threat at the top of the draft version of the JOE was the detonation of a nuclear device by a terrorist organization in one or two cities in the United States. Certainly, if a 10-kiloton weapon exploded in Central Park or Times Square it would be a god-awful day for the United States and certainly a terrible day for the citizens of New York City. But the nation would survive. But if Russia or China were to unleash its nuclear arsenal on the United States—something each is certainly capable of doing—it would be the end of the United States. These existential threats to our very existence as a nation should remain and do remain the number one threats to the United States.

Skeptics may ask, what are the odds of that happening? The point is no one knows for sure. But thinking about this event and devising ways to prevent or minimize its likelihood is the job of the U.S. military. For "red-zone" events on the classic risk matrix, particularly those with low probability but extremely high consequence, the nation expects the military to pay attention and not simply assume away the risk. When a military capability exists that threatens national survival, it is not the role of the military to weigh the odds of its use. History has taught us that when a military capability exists, the will to use it can change in very short order—unless the decision maker is effectively deterred.

Recently, we have seen some change in U.S. thinking. The 2016 version of the JOE strategy document mentions the importance of nuclear deterrence several times and the possibility that nuclear weapons could proliferate and maybe even be used in the coming years up to 2035. This change within the JOE reflects progress in our nuclear focus and thinking.

Deterrence Defined

To deter is defined as to turn aside, discourage, or prevent someone from acting. Key is the notion that someone or some decision body can be influenced by the actions of another. In the context of nuclear deterrence, the intent is to cause a decision maker (or decision makers) to refrain from certain acts under certain circumstances out of the fear that, if they take those actions, they will fail to achieve their objectives (deterrence by denial) and/or suffer unacceptable consequences (deterrence by threat of punishment). Further, the decision maker must also believe that refraining from the specific action is the best possible choice out of all the likely miserable choices. It may not be a good choice, but in light of the threatened consequences, it must be the least worst option.

Why We Have Nuclear Weapons

Fundamentally, we have nuclear weapons to deter attacks on the United States and our allies. Further, with regard to our allies, the U.S. nuclear deterrent is meant to assure them that the United States will use its nuclear arsenal to deter adversary aggression against them as well. We offer this "nuclear umbrella" so as to strengthen our alliances and also encourage our allies to not develop their own nuclear deterrent. In essence, nuclear assurance is a fundamental and demonstrably effective part of the U.S. nonproliferation policy.

Demonstrating Deterrence

For deterrence to be effective for national defense and assurance, the United States must possess two things: capability and will. Simply having capability is not sufficient. Both capability and the will to use it must be made believable in the mind of the adversary. Demonstrations of capability and will are essential to ensure adversaries receive a clear signal of what the United States can do and what it is willing to do.

At the end of World War II, we demonstrated our capability and will emphatically over Hiroshima and Nagasaki. During the Cold War, we showed our capability by building an effective triad of delivery vehicles and conducting 1,054 nuclear tests. Of those, 219 tests were detonated above ground or in shallow water so there was a visible effect—like the sinking of ships or the destruction of military equipment.[2] These visible signs certainly painted a clear picture of U.S. capabilities for the Soviet Union. There was also a demonstration of U.S. will in some of these tests. Indeed, some tests and their frequency were as much a part of signaling our will as they were of testing new weapon designs.

Today the United States and Russia demonstrate capability with tests of their delivery systems. U.S. intercontinental ballistic missiles launch from Vandenberg Air Force Base, California, and from submarines impacting in the Kwajalein Atoll. The Russians launch both their sea-based and land-based missiles from west to east across Siberia, impacting in Kamchatka. The Russians further demonstrate the bomber leg of their triad by flying nuclear cruise missile–capable bombers near Alaska and off the east and west coast of the U.S. mainland.

Contributing to the earlier discussed reduction in focus, between 1992 and 2008, the United States allowed the bomber leg of the triad to atrophy. Bombers had been taken off constant alert at the end of the Cold War, and though the United States claimed to retain the capability, it

rarely demonstrated it and hence put in question this leg of our triad's credibility. In fact, by 2008, U.S. Strategic Command devolved to conducting only command-post exercises for the nuclear war plan. While these exercises were useful training for the command-and-control element of the deterrent, they did not produce the kind of signaling required for deterrence, nor did they ever explicitly demonstrate capability. Beginning in 2009, field-training exercises (FTX) were reinstituted. These training events visibly exercise the critical elements of the bomber leg, to include the generation of tankers, bombers, aircrew, maintenance personnel, security forces, and weapons load crews to alert status; the uploading of nuclear weapons; and the scramble launching of the bombers and tankers to conduct simulated nuclear missions and their recovery to dispersed locations. In addition, nuclear command-and-control aircraft also participate and exercise their wartime mission. An FTX demonstrates capability and will while signaling the credibility of the nuclear force to those we want to deter. It is intentionally made visible to China and Russia to create the awareness that is fundamental to deterrence.

Figure 2: An unarmed Minuteman III ICBM test launch in 2020.
Credit: U.S. Air Force photo by Vandenberg Air Force Base Public Affairs

Stanley Kubrick's satirical Cold War movie, *Dr. Strangelove*, illustrates this point. Good satirical comedy is most effective when it contains a thread of truth, and, in this case, the truth Kubrick's screenwriters likely called upon came from the writings of Schelling and Kahn, the two great nuclear deterrence theorists of the day. At the end of the movie, after one nuclear bomb detonates on the Soviet Union, the Russian ambassador says this is a terrible thing. Of course, the U.S. president agrees. But the Russian ambassador then reveals the existence of a secret automated doomsday system that will now instantly launch the entire Soviet arsenal against the United States. Peter Sellers, acting as the president, replies, "Mr. Ambassador, you know, of course, that the whole point of a doomsday machine is lost if you keep it a secret!"[3]

One can signal will through tests and exercises—and also through rhetoric. Nikita Khrushchev used rhetoric when addressing the United States at the United Nations: "We will bury you."[4] John Kennedy made rhetorical statements during the Cuban missile crisis when he declared a launch of a nuclear missile from Cuba against any target in the Western Hemisphere would be met with a full retaliatory response of the United States against the Soviet Union.[5] That is a very strong redline and a way of signaling will. Consider Kim Jung Un and his "sea of fire" comments.[6] Kim uses rhetoric to signal his willingness to cross certain thresholds, whether they be chemical, biological, or nuclear. A few years ago, the United States announced a redline in Syria with the intent of deterring Bashar al-Assad from using chemical weapons in his civil war. But the declaration of redlines must be carefully considered, for if one ever backs away from a declared redline the resulting injury to credibility can lead to future miscalculation on the part of adversaries and, perhaps just as importantly, can degrade the credibility of our assurances to allies.

Figure 3: 100 nuclear-capable B-1B Lancer aircraft were procured from 1985-1988. Today, fewer than half of them remain in the force and they have been modified so that they are no longer nuclear-capable.
Credit: U.S. Air Force photo by Senior Airman Austin McIntosh

Could the "Unthinkable" Happen?

Between the United States and Russia, the credibility of each respective deterrent force is well understood. Both face an existential threat to this day, which is held at bay by similar stakes and risks. The strategic nuclear relationship is stable because there is no huge imbalance in strategic forces, nor is there a particular vulnerability either side has that would invite the other to strike first. This is the essence of strategic stability. Consequently, there is not a single day that our adversaries wake up and calculate that it would be a good day to launch a nuclear attack on the United States or its allies.

However, a change in Russia's declaratory nuclear policy in the past few years may in fact reflect a lowered threshold for the first use of a nuclear weapon in an otherwise conventional theater conflict for the first time since the Cold War. Russia's new declaratory policy is to threaten to escalate to limited nuclear use to coerce Western capitulation in a conventional conflict they see as not going in their favor and to actually launch limited nuclear strikes for this reason if necessary. The Russians may have always thought this way, but now they have declared it.[7] This expectation of advantage from coercive nuclear threats or use could potentially lead to future miscalculation on the part of the Russians about how the United States might respond.

Russian President Putin has boasted that he could have Russian troops in five NATO capitals in two days. So, here is a hypothetical miscalculation: After early success in a conflict initiated by invading Russian forces against NATO forces in the Baltic states, the Russians find themselves on the defensive and in retreat. It would seem reasonable that they would consider using the low-yield battlefield nuclear weapons that they are currently fielding to stand firm in their declaratory policy of "escalate to de-escalate," in the belief that the United States would not respond with higher collateral-damage nuclear weapons because it no longer has similar low-yield weapons in its inventory. But this is precisely what the United States might feel it has to do to preserve the long-term credibility of the nuclear deterrent and its commitment to the alliance. Clearly, we must address the potential for such Russian miscalculation.

Unlike Russia, China has declared a no-first-use policy. But if read carefully, the policy is rife with caveats and exceptions that suggest that, in a losing position in a conventional fight, they too would consider nuclear first use.[8] History teaches that various dynasties throughout China's history have typically collapsed not from external invasion but from internal revolt. It would stand to reason given China's current military power and its weaker neighbors (arguably with the exception of Russia), the most likely threat to the sustainment of the current dynasty (the Communist Party) is from internal revolt. In most of the last century, the unifying factor in post–World War II China was Communist ideology and the deified figure of Mao Tse-tung. Today, no one in China wears Mao suits or carries his little red book. Today, there appears to be a fervent rise in nationalism encouraged by the Communist Party. The party is not deified. Instead, pride in the party's promise may be the underpinning of the Communist Party's legitimacy: "We are back—150 years of shame are behind us. We are a great power and a great nation. We not only deserve but demand and command respect." So here is another hypothetical miscalculation: one could envision that if China were to find itself in a conflict with the United States in a fight over the South China Sea, it would consider crossing the nuclear threshold to prevent defeat and the prospect of being "dethroned" by its own populace should the Potemkin village of its promises be realized. And, further, might they calculate (or miscalculate) that the United States would not dare cross the threshold in response out of fear of a Chinese nuclear attack on the U.S. mainland?

To be sure, these are hypotheticals, but as soon as one starts talking about first use in localized theater conventional conflicts (and both Russia and China have), it demands that we not only start thinking and war-gaming these type of scenarios but also that we closely examine our current nuclear force structure and ask ourselves if we have the right equipment to first deter and second to present appropriate response options to the U.S. president.

North Korea and the Nuclear Imbalance

As discussed, Russia, China, and the United States have similar stakes in the nuclear game. But with North Korea, there is an imbalance. North Korea has all its chips on the table while we do not, because we hold an existential threat over it, and it does not hold one over us. This imbalance in the stakes is a new twist to the nuclear deterrence calculus of the past 70 years. It is important to analyze the impact of this imbalance in stakes because it is possible that the threshold for first use is different when an imbalance exists.

During the Cold War, we targeted a lot of things in the Soviet Union mostly because we did not know with absolute certainty what they feared or valued most. As a result, we considered the matter broadly and held five different target sets at risk and assumed the Soviets had to fear at least three or four of those sets. While we did not deliberately target population centers, there were targets close to population centers, the destruction of which would certainly have caused a lot of civilian casualties. The strategy was not a so-called minimal deterrent—just have the minimum capability to threaten to destroy all of their cities—because we were not sure Stalin or Mao even cared about their people. After all, Stalin killed 25 million of his own people after World War II and is quoted as saying the death of a human being is a tragedy but the death of 25 million humans is a statistic.[9] Mao Tse-tung said he did not need a lot of nuclear weapons to deter the United States: "If I kill 300 million of them and they kill 300 million of us, I still have a billion people and they have nothing."[10]

Figure 4: The B-2 Spirit's first flight was over 35 years ago. Only 19 of the nuclear-capable aircraft remain in the force.
Credit: U.S. Air Force photo by Christian Turner

The imbalance of stakes in North Korea could, ironically, lead Kim Jong Un (another tyrant who has shown little concern for his own populace) to nuclear first use. Recalling the fates of Saddam Hussein and Mu'ammar Gaddhafi and the likely endgame for himself in a lost conventional fight, he might conclude he has nothing more to lose by crossing the nuclear threshold in a conventional fight on the Korean peninsula. Presented in nuclear deterrence terms, in spite of the U.S. existential threat, Kim could decide using a nuclear weapon may not be his personal least worst option. In that regard, how much have we thought recently about entering a nuclear battlefield and operating in a nuclear environment? We did this during the Cold War. In current circumstances, we need to be thinking again about what the fights of the future are going to be like if someone detonates a nuclear weapon on a future battlefield.

Assuring Allies

When considering the assurance element of our nuclear deterrent policy, it is important to remember that the United States does not get to decide if our allies are assured—they do. We cannot make them assured; they decide if our assurance is credible. The United States learned this lesson in 2010. For budgetary reasons, the U.S. Navy wanted to retire the nuclear-tipped Tomahawk land attack cruise missile (TLAM/N) carried on attack submarines in the Western Pacific. Apparently unbeknownst to our allies, this weapon had been taken off the subs and stored ashore for quite a while, and it was going to cost the U.S. Navy a lot of money to get them refurbished and recertified for use. From the Navy perspective the missile was not being used and was expensive to redeploy. From the policy perspective the Obama administration wanted to de-emphasize our reliance on nuclear weapons, and eliminating this class of weapons seemed like a great way to show the world we were serious about decreasing our arsenal. We announced the decision to eliminate the TLAM/N in the 2010 Nuclear Posture Review. In spite of our diplomatic outreach to explain our rationale, the Japanese objected strenuously to what seemed to the United States to be a logical decision. The Japanese objected because they believed the TLAM/N, with its forward presence in the Western Pacific, was the only

credible deterrent to the Chinese and the Russians. They questioned the credibility of a U.S. deterrent based only on the U.S. threat of launching an intercontinental ballistic missile from either our ICBM fields or *Ohio*-class submarines to come to their defense. They did not think the Chinese or the Russians would adequately believe such threats. Instead, they feared such a method of attack could invite a retaliatory attack on the U.S. mainland, and they did not believe the United States would be willing to "trade Seattle for Tokyo." In sum, the elimination of TLAM/N undermined our assurance of Japan. What had assured them was a nuclear capability that had a smaller yield than an ICBM, which could be deployed from in theater, for an in-theater scenario, and that would have the possibility of not presenting a threat to major cities of the combatants involved but instead be used in a tactically credible manner. The Japanese believed the threat of the United States using TLAM/Ns provided a credible deterrent of an attack on them. Furthermore, they believed the Chinese and Russians felt the same way.

To rebuild assurance, the United States successfully persuaded Japan that the bomber leg of the triad could be deployed in theater and was flexible enough to deliver capabilities similar to the TLAM/N—for example, air-launched cruise missiles (ALCM) and/or gravity bombs. Subsequent deployments of elements of the bomber leg to Guam have served to reassure the Japanese and the South Koreans. Indeed, when bomber training missions are flown over the Korean peninsula or in the Western Pacific they serve two purposes: to deter North Korean aggression and, just as importantly, to assure the South Koreans and the Japanese that the U.S. nuclear umbrella is very real and credible. Again, assurance is critical to support U.S. alliances and U.S. nonproliferation policy. Japan and South Korea certainly have the knowhow, tools, and materials available to field a nuclear arsenal, but the United States does not currently believe that their doing so would be in either their interests or ours.

During the 2016 presidential campaign, a candidate suggested it might be cheaper if Japan and South Korea developed their own nuclear weapons.[11] But we must ask ourselves, would that result in a safer world? Today, several countries hang in the balance between assurance and possible proliferation. Japan, South Korea, and Taiwan are capable. They could join the nuclear club quickly if no longer assured. If Shiite Iran were to build a nuclear weapon, it is likely Sunni-dominated Saudi Arabia would respond in kind. And if Saudi Arabia went nuclear, would Turkey be interested in doing the same? Egypt? While none of these proliferation scenarios are certain, they are possible, and it is not likely that a world with this level of proliferation would be a safer place.

In the case of assurance, we can decide that assurance is an important goal, but we cannot decide who is assured—and in some cases our assurance efforts have failed, even with friends and allies. France was not assured the United States would trade New York City for Paris and built its own nuclear deterrent. Israel could not be assured by anyone in the West and reportedly has its own unacknowledged nuclear deterrent.

Our Nuclear Deterrent Future

Unlike Russia, China, Pakistan, India, and now North Korea, the United States has uniquely and unilaterally decided not to build new nuclear weapons. We are maintaining our current stockpile, which consists of the B61 gravity bomb for the B-2 bomber and the NATO deterrent force; the W76 and W88 warheads for our submarine-launched ballistic missiles (SLBM); the W78 and W87 warheads for our ICBMs; and the W80 warhead for our

cruise missiles. (Incidentally, the number represents the year they were designed. So our newest nuclear weapon is a 1988 design. The oldest is the B61 gravity bomb, a 1961 design that is now being refurbished.) This life extension is the only allowed effort to sustain our deterrent, while most every other nuclear-armed country is building new nuclear weapons and adding to inventory. Russia, for example, is not only building new strategic nuclear weapons, but it also is building and fielding new tactical/theater nuclear weapons. It is mounting and deploying nuclear warheads on surface-to-air missiles and surface-to-surface missiles such as the Iskandar, which is deployed in Eastern Europe. Moscow is adding nuclear capability atop antiballistic missiles and in torpedoes, depth charges, and cruise missiles that can be launched from airplanes and from surface ships. The Russians have also discussed the possibility of placing nuclear-armed cruise missiles on icebreakers in the Arctic with the ability to range the continental United States. In sharp contrast, with the exception of a variant of the B61 that can be delivered by only a small percentage of the Air Force fighter fleet of aircraft, the United States has eliminated all of the tactical nuclear weapon capability it fielded in the Cold War. The bottom line is, despite the Russian political pledge to do the same, we eliminated and the Russians are building up.[12]

China, which once felt it could adequately deter the United States with 20 multi-megaton armed, silo-based ICBMs, is in the process of deploying land-mobile, nuclear tipped ICBMs as well as multiple short- and intermediate-range missiles that are nuclear capable. In addition, the Chinese have begun deployment of a fleet of nuclear missile-armed submarines, nuclear capable bombers, and hundreds of land-based ICBMs.[13]

The development of new weapon systems and new warheads that put at risk U.S. forces and our allies in Asia and Europe as well as the U.S. homeland is the path China and Russia are on. Meanwhile, current U.S. policy continues to prohibit the design and building of any new nuclear weapons.

Even if given the green light to design and build a single new type of nuclear weapon, our ability to do so is, at best, problematic. The infrastructure that once existed in the Cold War to design, engineer, and manufacture nuclear warheads en masse is, in the words of the bipartisan 2009 Perry-Schlesinger report on America's strategic posture, "decrepit."[14] Even more concerning is the aging out of the human capital knowhow to design, engineer, and manufacture a new weapon. Recall our newest weapon was designed in 1988. Not many people left in the enterprise have ever built or tested a new weapon. In 10 years, they will all be gone. And in 10 years, what if the geopolitical situation in the world (think mass proliferation) should worsen? Will the United States be in a position to build new or additional weapons should a future president decide that is what is required for credible deterrence and national security? Russia will be, China will be, and even Pakistan will be, each of which today can and is building more new nuclear weapons than the United States is able to.

So, failing an investment in the reconstitution of a nuclear weapon–production enterprise as a hedge against future geopolitical uncertainty, what options does the United States have in the near term to hedge against this scenario? Or worse yet, should some technical problem render either a single class of SLBM or ICBM warhead or a missile system or submarine unusable for an extended period of time (think years), what options does the United States have to maintain effective deterrence vis-à-vis the Russians? The only answer to both scenarios is the ALCM. Because of the "bomber counting rule" in

the New Start Treaty, a nuclear bomber only counts as one of the 1,550 weapons either side is allowed to field on their strategic deterrent platforms regardless of how many bombs can be loaded on a single bomber. So a B-52 counts as one weapon even though it can carry up to 20 nuclear-armed cruise missiles. Consequently, in either of the above scenarios, the president could direct the B-52 force to return to alert status with some 400 nuclear-armed cruise missiles postured in a survivable mode, similar to a submarine at sea, within a matter of days. In fact, besides being the most cost–imposing weapon system in the triad, the ALCM is the only hedge the United States has against either a dangerous change in the geopolitical environment or a technical failure in either of the other two legs of the triad. This is the imperative for fielding the so-called long-range standoff cruise missile replacement of the aging ALCM. The fielding of a nuclear-armed sea launch cruise missile with low yield options (SLCM-N) would further serve to deter our adversaries' potential miscalculation that we would not respond to a low yield first use, strengthen allied assurance, and provide a hedge against technical failures in the SLMB and ICBM forces.

Nuclear Perspective

Some planners may think the buildup of Russian tactical nuclear weapons is not particularly threatening to our conventional forces. Compared to the Hiroshima bomb at 10 kilotons and the Nagasaki weapon at approximately 16 kilotons, a nuclear artillery shell with only a one-half kiloton yield might seem inconsequential. This is where the numbers become enlightening when put into perspective. A one-half kiloton nuclear artillery shell is equivalent to 500 Mark 84, 2,000-pound bombs detonating simultaneously over your position. A more recent comparison is the massive ordnance air burst (MOAB) bomb. One-half kiloton equates to 30 MOABs detonating simultaneously on your command post, airfield, or deployed force. And that half-kiloton round can be fired from 20 miles away through a 155mm equivalent artillery piece, with more likely to follow.

If deterrence were ever to fail and the nuclear threshold crossed, be it next month, next year, or in 50 years, will the United States have the right tools to offer the president to de-escalate the situation on acceptable conditions? One thing is certain: if China,

Figure 5: The nuclear-capable B-21 Raider had its first flight in 2023.
Credit: U.S. Air Force photo

Russia, or North Korea cross the threshold of first use against one of our allies, deployed U.S. forces, or the homeland, I expect one of the first things the president would do is turn to the Secretary of Defense and say, "Make them stop, now!" Our response must be more flexible than to assert we can put a multi-hundred-kiloton weapon on their nation's capital in 30 minutes. The president and the nation deserve more options than that.

Conclusion

Historical evidence and reason lead me to believe that the U.S. nuclear deterrent has successfully accomplished its purpose since 1945. In fact, nuclear weapons are the one set of military systems that have been 100 percent successful in their assigned mission. They have deterred attack on the United States and its allies, assured our allies, and, though not specifically called out in U.S. policy, deterred major nuclear powers from engaging in global conventional warfare on the scale we witnessed in the first half of the last century. However, there is no evidence that our self-imposed policies and constraints have constrained any other nuclear-armed or aspiring nuclear power. Simple prudence now demands that we take the steps necessary to ensure the continued health of our current nuclear deterrent. We must recapitalize all elements of the triad and make the appropriate investments in the Department of Energy infrastructure and human capital to ensure that presidents in 10, 20, 30, or 40 years and beyond have the necessary tools at hand to effectively deter against all existential threats. ✪

Endnotes

1 For more information on this incident, see Michelle Spencer, Aadina Ludin, and Heather Nelson, The Unauthorized Movement of Nuclear Weapons and Mistaken Shipment of Classified Missile Components: An Assessment (Maxwell Air Force Base, AL: USAF Counterproliferation Center | Air University, January 2012).

2 For more information, see Office of the Secretary of Defense (OSD), Deputy Assistant Secretary of Defense for Nuclear Matters (DASD[NM]), "History of Nuclear Explosive Testing," in *The Nuclear Weapons Handbook 2020* [Revised] (OSD, 2020), chapter 14.

3 For more on this concept, see Brendan Rittenhouse Green and Austin Long, "Invisible Doomsday Machines: The Challenge of Clandestine Capabilities and Deterrence," *War on the Rocks*, December 15, 2017.

4 While there is disagreement on this translation from the original Russian, the overall message was clear. See "Did Khrushchev bang his shoe at the UN?" UN Story on YouTube, September 21, 2023.

5 See full speech: John F. Kennedy, "Address During the Cuban Missile Crisis," October 22, 1962, available via the John F. Kennedy Presidential Library and Museum.

6 "North Korea threatens 'a sea of fire' upon South Korea," *CNN*, November 25, 2011.

7 This essay was originally published in 2017. For an update on the status of Russian nuclear doctrine and its application in the ongoing war in Ukraine, see Heather Williams et al., "Russian Nuclear Calibration in the War in Ukraine," CSIS brief, February 23, 2024.

8 Since the writing of this essay, it is still assessed that China's "no first use" policy could have a somewhat fluid definition. For example, it might only apply to certain circumstances or against certain adversaries. It's also argued that they could interpret this doctrine to mean the credible threat of first use to attain a desired strategic effect would now be acceptable in the right circumstances, so long as their forces do not follow through. See Sari Arho Havrén, "China's No First Use of Nuclear Weapons Policy: Change or False Alarm?" The Royal United Services Institute for Defence and Security Studies, October 13, 2023; and Tong Zhao, *Political Drivers of China's Changing Nuclear Policy: Implications for U.S.-China Nuclear Relations and International Security* (Washington, DC: Carnegie Endowment for International Peace, July 17, 2024).

9 First attributed to Stalin in the *Washington Post*, January 20, 1947. It may have originally come from German satirist, Kurt Tucholsky, and attributed to a French diplomat in his article "French Wit," *Voss's Newspaper*, August 23, 1925.

10 The translation of this speech varies, but the message Mao intended was that he did not fear nuclear war because even if half of the population was killed, it would destroy "imperialism" and the other half of the population would thrive and regenerate again under socialism. See "Excerpt from the Unedited Translation of Mao Zedong's Speech at the Moscow Conference of Communist and Workers' Parties," November 18, 1957, available via the Wilson Center Digital Archive.

11 Zack Beauchamp, "Donald Trump: make America great again by letting more countries have nukes," *Vox*, March 30, 2016.

12 For an update of Russia's modernization of nuclear forces, see Hans M. Kristensen et al., "Russian nuclear weapons, 2024," *Bulletin of the Atomic Scientists*, March 7, 2024. The *Bulletin of the Atomic Scientists*, which is pro-denuclearization and usually provides conservative estimates of Russia's nuclear forces, said in this latest report, "Russia is nearing the completion of a decades-long effort to replace all of its strategic and non-strategic nuclear-capable systems with newer versions. In December 2023, Russian Defence Minister Sergei Shoigu reported that modern weapons and equipment now make up 95 percent of Russia's nuclear triad—an increase of 3.7 percent from the previous year. … As of early 2024, we estimate that Russia has a stockpile of approximately 4,380 nuclear warheads assigned for use by long-range strategic launchers and shorter-range tactical nuclear forces. … In addition to the military stockpile for operational forces, a large number—approximately 1,200—of retired but still largely intact warheads await dismantlement, for a total inventory of approximately 5,580 warheads."

13 For an update of China's expansion of nuclear forces, see Hans M. Kristensen et al., "Chinese nuclear weapons, 2024," *Bulletin of the Atomic Scientists*, January 15, 2024. The *Bulletin of the Atomic Scientists*, which is pro-denuclearization and usually provides conservative estimates of China's nuclear forces, said in this latest report, "Within the past five years, China has significantly expanded its ongoing nuclear modernization program by fielding more types and greater numbers of nuclear weapons than ever before."

14 William J. Perry and James R. Schlesinger et al., America's Strategic Posture: The Final Report of the Congressional Commission on the Strategic Posture of the United States (Washington, DC: United States Institute of Peace, 2009.)

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Gen Kevin P. Chilton, USAF (Ret.), holds the Explorer Chair for Space Warfighting Studies at the Mitchell Institute for Aerospace Studies Spacepower Advantage Center of Excellence (MISPACE). Retiring in 2011, General Chilton completed a 34 1/2 year Air Force career as Commander of U.S. Strategic Command from 2007 to 2011. Prior to this assignment, General Chilton commanded at the wing, numbered air force, major command and unified combatant command levels, including serving as Commander of Air Force Space Command. He flew operational assignments in the R-4C and F-15 and, as an Air Force test pilot, he conducted weapons testing in various models of the F-4 and F-15. He also served 11 years as a NASA astronaut, where he flew as the Commander of STS-76, his third Space Shuttle mission, and served as the Deputy Program Manager for Operations for the International Space Station Program. General Chilton is a distinguished graduate of the U.S. Air Force Academy, with a Bachelor of Sciences degree in engineering sciences, a Columbia University Guggenheim Fellow with a Master of Sciences degree in mechanical engineering, and a distinguished graduate of the U.S. Air Force pilot training and test pilot schools. He also was awarded an honorary Doctor of Laws degree from Creighton University.