

# Ghosts of the Cold War:

Rethinking  
the Need  
for a  
New Nuclear  
Cruise Missile



April 2016  
By Will Saetren

**PLOUGHSHARES FUND**

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An AGM-28 Hound Dog nuclear cruise missile loaded on a B-52 bomber.

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# Foreword

I was 12 years old when the United States dropped two atomic weapons on Japan. To this day I vividly remember the photos of victims burned head-to-toe, many so badly that their skin was literally sloughing off their bodies. Others simply became shadows burned into stone.

The lesson is this: we can never forget the consequences of nuclear weapons, nor can we fool ourselves into believing that so-called “limited” nuclear wars are possible.

That’s why I strongly oppose the creation of a new nuclear cruise missile, the so-called Long Range Standoff Weapon, or LRSO.

The Defense Department is wrong to argue that this is not a new nuclear weapon. The LRSO will have an upgraded W-80 warhead capable of immense destruction. And it will be fitted onto a new missile specifically designed to defeat the world’s most advanced missile defense systems.

Senior U.S. defense officials have begun to tout this weapon as having a role “beyond deterrence.” This talk of a limited nuclear war will only spur our adversaries to develop similarly advanced capabilities. Russia already has air- and sea-launched nuclear cruise missiles, and China is capable of developing the same.

Instead of devoting our resources to a new powerful nuclear weapon, the next administration would be wise to follow one of the main conclusions of the 2010 Nuclear Posture Review and reduce the role of our nuclear arsenal by developing advanced conventional capabilities.

The Air Force has already developed a conventional alternative to the LRSO called the Joint Air-to-Surface Standoff Missile. Instead of investing tens of billions of dollars into the LRSO, we should retire our current nuclear cruise missile and rely on sufficiently capable conventional weapons.

If the United States pursues this course, our ability to deter a nuclear attack will be unaffected. We will still have the ability to deploy more than 1,500 nuclear weapons across our nuclear triad, firepower capable of unleashing unimaginable consequences on the world.

I welcome this timely report by the Ploughshares Fund. I hope the public and my congressional colleagues will review it and join my efforts to stop the LRSO from ever being built.

Senator Dianne Feinstein  
April 2016

# Preface

The United States has more than 1,500 nuclear warheads deployed on a “triad” of submarines, bombers, and land-based missiles. These doomsday weapons were built during the Cold War to fight an enemy that no longer exists.

The Cold War and the USSR are gone, but the weapons remain. And the submarines, bombers, and missiles are aging. They must be retired or replaced. President Barack Obama has approved plans to rebuild and maintain them all, with a price tag of about \$1 trillion over the next 30 years.

A complete rebuild of the U.S. nuclear arsenal is neither justified by the external threat nor supported by the federal budget. Russia may be causing trouble in Eastern Europe, but it has nothing to gain from nuclear war with the United States. Meanwhile, the limited U.S. defense budget would be much better spent addressing higher priority threats, such as terrorism, cyber attacks and global warming.

Moreover, pursuing an excessive arsenal runs the risk of igniting a new arms race with Russia that could needlessly undermine U.S. security. “We are about to begin a new round in the nuclear arms race unless some brake is put on it right now,” former Secretary of Defense William J. Perry recently warned. Indeed, a new arms race has already begun in slow motion. Multiyear contracts are being signed, such as the recent one with Northrop Grumman for a new strategic bomber, and billions of dollars are being spent. Before long, the programs will become too big to stop.

The curtain is closing on the Obama administration, and it will be up to the next president to bring U.S. plans for its nuclear arsenal back to reality. There are many ways to scale back the current bloated programs, saving hundreds of billions of dollars while still maintaining a strong U.S. nuclear deterrent for as long as needed.

Exhibit A is the subject of this report, the new nuclear air-launched cruise missile. This weapon is unnecessary, expensive and dangerous. A nuclear cruise missile that can penetrate enemy air defenses has never been deployed on a long-range bomber that can also defeat air defenses. We did not need to do so during the Cold War, and we do not need to do so now.

Seven years ago, in April 2009, President Obama gave a speech in Prague, in the Czech Republic, where he called for “the peace and security of a world without nuclear weapons.” The next president can continue that quest by canceling the new nuclear cruise missile as a first step toward a global ban on these destabilizing weapons.

Tom Z. Collina  
Policy Director  
Ploughshares Fund  
April 2016

“There is scant justification for spending tens of billions of dollars on a new nuclear air-launched cruise missile.”

- William J. Perry and Andrew C. Weber

# Executive Summary

The Obama administration plans to spend about \$30 billion over the next two decades on a new nuclear air-launched cruise missile. Called the Long-Range Stand-Off weapon (LRSO), the missile would replace the existing nuclear air-launched cruise missile (ALCM) when it is retired in 2030. The administration also plans to spend at least another \$100 billion on 100 new B-21 stealth bombers to carry the new cruise missile. The B-21 is scheduled to start production in 2025.

These programs are part of a larger effort to maintain, replace and enhance the lethality of the U.S. nuclear arsenal over the next 30 years, at an estimated cost of \$1 trillion. Experts, including former Secretary of Defense William J. Perry, have warned that following through on these plans unnecessarily risks sparking a new arms race.

The existing nuclear air-launched cruise missile was first deployed in 1982 as a means of protecting the non-stealthy B-52 bomber from air defenses. Equipped with the ALCM, the B-52 could fire its nuclear weapons from afar, without entering enemy airspace.

This was meant to be an interim solution. When the B-2 stealth bomber, which only carries nuclear gravity bombs that can be dropped from above, entered the force in the 1990s, the B-52 and the cruise missile were scheduled to be retired. That plan was modified in 1992 when the B-2 purchase was reduced from 132 to 21 aircraft. Too few B-2s were built to replace the B-52 force. The result is that the B-52 and the nuclear air-launched cruise missile remain in service today.

Once the B-21 is ready, the Air Force will have enough modern stealth bombers to retire the B-52. The nuclear air-launched cruise missile should be retired as well.

Replacing the ALCM with a new nuclear air-launched cruise missile would have a negative impact on American national security. If the new cruise missile is ever used for limited nuclear warfighting, as military plans call for, the exchange could spiral out of control, igniting a nuclear war that would kill millions. Because air-launched cruise missiles come in conventional and nuclear variants, their use could prompt a miscalculation, leading an adversary to launch a nuclear response to a conventional attack.

That is an unnecessary risk to take. Non-nuclear cruise missiles can take on the same missions as nuclear cruise missiles. In the extremely unlikely scenario that a nuclear option is needed, the military can call on other nuclear weapons in the U.S. arsenal.

The United States is not alone in facing the challenges posed by nuclear cruise missiles. All nuclear-armed states are adversely impacted by the instability posed by these weapons, and all would benefit from their elimination. President Obama can strengthen America's security by canceling the new nuclear air-launched cruise missile, and he can use it as a starting point to push for a global ban on all nuclear cruise missiles. Once conceived as a means of strengthening America's national security interests, the nuclear air-launched cruise missile has become a liability.

**“The so-called improvements to this weapon seemed to be designed, candidly, to make it more usable, to help us fight and win a limited nuclear war. I find that a shocking concept.”**

- Senator Dianne Feinstein (D-CA)

# A Brief History of the Nuclear Cruise Missile

Defense planners have always seen nuclear air-launched cruise missiles as an alternative to bombers that can evade air defenses and fly into enemy airspace. Current plans to arm the new B-21 bomber with the Long-Range Stand-Off weapon (LRSO) contradict decades of strategic thinking.

The need for long-range strategic strike capability emerged during WWII when the Allies became concerned that the United Kingdom might fall to Nazi Germany. At the time, UK airstrips were essential to America's ability to strike critical Axis targets with heavy bombers such as the B-17 and B-26. These heavy bombers lacked intercontinental range and were limited to operations in the theaters in which they were deployed.

Although Britain never fell to the Nazis, military planners became convinced that they needed to develop the capability to strike targets anywhere in the world from air bases in the continental United States. In 1945 the U.S. Army Air Corps (the predecessor to the Air Force) hosted a design competition for a new bomber with a combat radius of 5,000 miles and capability to carry 10,000 pounds of bombs. Boeing won the competition, and in 1946 it received the contract to build the new bomber. Nine years later, that aircraft, the B-52, was ready to go into full scale production.<sup>1</sup>

The B-52 bomber quickly became the cornerstone of American strategic air power. With its ability to deliver large payloads over intercontinental distances, it was a key tool for the American president to project power anywhere in the world on short notice.

The B-52 was also the core of America's nuclear mission. During the early stages of the Cold War, the B-52 was the only intercontinental delivery platform for America's rapidly growing nuclear arsenal. Bombers equipped with nuclear gravity bombs were kept on high alert at U.S. bases, and from 1961 to 1968, nuclear-armed B-52s were kept on continuous airborne patrol to ensure a rapid response capability in the event of a nuclear war.

The 1950s and 1960s also saw a series of changes that challenged the B-52's role in the nuclear arsenal. With the development of nuclear-armed submarines and intercontinental ballistic missiles (ICBMs), the B-52 was no longer America's sole means of threatening strategic targets with nuclear weapons. This new "triad" of delivery systems, a reference to the three legs of the nuclear arsenal, meant that America could hedge against failures in a given weapons system. In the unlikely event that one of the legs of the triad should fail, or if an adversary developed defensive



A B-52 bomber loaded with AGM-28 Hound Dog cruise missiles during takeoff.



measures rendering that platform ineffective, the other two delivery systems could be called upon.

In 1960, Russia shot down a U2 spy plane that was flying over Soviet territory. This incident served as a wakeup call for the Air Force that its other high-flying planes, such as the B-52, were also vulnerable to Soviet air defenses. This vulnerability was highlighted during the Vietnam War when 31 B-52s were lost to enemy anti-aircraft fire.<sup>2</sup>

## The Emergence of Dual Capabilities

The Air Force decided that the solution to its bomber problem was to build a new plane that could evade enemy air defenses. One that could fly faster, lower to the ground, and emit a smaller radar signature than the B-52. But new planes are expensive and take decades to design, develop, test and field. In order to keep the B-52 flying while a replacement bomber was developed, the Air Force began exploring air-launched cruise missiles as a way of enhancing existing bombers.

Nuclear air-launched cruise missiles have been used by the Air Force since 1960 when the Hound Dog (named after the hit song by Elvis Presley) entered the service. The Hound Dog was designed to be a substitute for the penetrating bomber, and came to be known as a “stand-off” weapon because it could be fired from beyond the reach of air defenses. Ultimately, the Hound Dog proved to be inefficient, due to its large size and limited range of just under 600 miles.<sup>3</sup> Only two could be equipped on the B-52, and because of its short range, the bomber would still have to enter contested airspace to strike the majority of targets in the Soviet Union.

But the design of the Hound Dog showed promise, and the Air Force ordered a series of studies on enhancing the capabilities of the existing bomber fleet with upgraded cruise missiles. These studies found that cruise missiles could be used as unarmed decoys that mimicked the radar signature of a B-52. Upon entering contested airspace, the bomber would launch a large number of decoys at its target, making it nearly impossible for air defenses to tell the difference between the real bomber and the decoys. These studies led to the creation of the Subsonic Cruise Aircraft Decoy (SCAD) program, which became a source of controversy in the halls of the Pentagon.<sup>4</sup>

As the SCAD program progressed, it became apparent to Pentagon planners that cruise missiles could serve as more than

just decoys. With the proper design, they could be constructed with the range and capability to carry nuclear warheads, making them powerful strategic weapons in their own right.

This development made cruise missiles a direct threat to the Air Force’s central mission, which was manned aerial combat. This mission had provided the rationale for separating the Air Force from the Army, giving the Air Force its own budget and institutional identity. As such, the Air Force has consistently favored building a penetrating bomber, and been highly critical of platforms which could jeopardize its core mission. Glenn Kent, an Air Force Lieutenant General who was in charge of the SCAD program in 1968, described the choice of developing an armed cruise missile as a “catch-22” for the Air Force. “People were afraid that if we went to Congress and said we wanted both the missile and the bomber, Congress would say, ‘O.K., here’s the missile but you can’t have the bomber.’”<sup>5</sup>

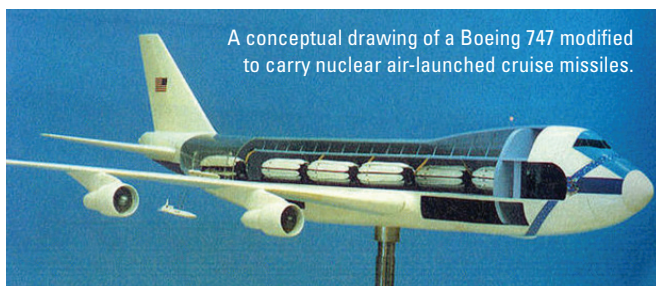
**“People were afraid that if we went to Congress and said we wanted both the missile and the bomber, Congress would say, ‘O.K., here’s the missile but you can’t have the bomber.’”**

By the 1970s, the cruise missile versus bomber debate had moved to the main stage of American politics. The Air Force released plans for its new bomber, the B-1, to be built by Rockwell International. The B-1 incorporated wing and engine designs that allowed it to fly at high speeds at altitudes as low as 500 feet. Flying fast and low made the bomber difficult to spot on radar, and combined with its radar-absorbing skin, it was almost impossible to target with surface-to-air missiles. Enemy interceptor aircraft would have to engage it, but with its high speed and sophisticated new electronic countermeasures (ECM), the B-1 had a distinct advantage over modern fighter aircraft of the time.<sup>6</sup>

But the B-1 was expensive, and cost estimates quickly spiraled out of control. Originally estimated to cost \$9.9 million each, the price jumped to \$30 million by 1973, and by 1976 it had ballooned to \$87 million per bomber.<sup>7</sup> Criticism of excessive spending in the bomber program soon followed, and civilian policy makers began calling for the SCAD program as an alternative to the B-1 bomber.

The SCAD program had experienced its own cost increases during its development phase, leading the Air Force to conclude that it was too expensive to justify as a decoy.





Since there was no other institutional reason to continue the program, the Air Force proposed to cancel it entirely. On July 7, 1973, Deputy Secretary of Defense William Clements notified Congress that the SCAD program would be terminated.<sup>8</sup>

Clements' argument, however, was contradicted by the Navy, which had been developing its own nuclear and conventional cruise missiles. Testing showed cruise missiles could deliver powerful payloads over long distances with a high degree of accuracy, making them ideally suited as a strategic weapon. The SCAD program was reinstated by Secretary of Defense Melvin Laird, who directed the Air Force to coordinate its cruise missile program with the Navy.

With the Air Force no longer in control of the SCAD program, studies began to emerge calling for the replacement of the B-1 with a version of the cruise missile. In 1976, two scholars from the Brookings Institution published a study recommending that a fleet of wide-bodied aircraft be used as cruise missile carriers to provide a stand-off strike capability that would bypass the need for the B-1's penetrating mission.<sup>9</sup> Carrying as many as 90 cruise missiles, these planes would be capable of striking far-off targets without entering contested airspace and jeopardizing the aircraft.<sup>10</sup>

The nuclear cruise missile being tested at the time, the AGM-86B, commonly referred to as the air-launched cruise missile (ALCM), had a range of more than 1,500 miles and used a sophisticated terrain contour-matching guidance system (TERCOM). The navigation system allowed the cruise missile to fly at extremely low altitudes, at high speeds, with an unprecedented level of accuracy. Coupled with its small size, (it was only 19 and a half feet long and weighed 3,000 pounds) the missile was extremely difficult for air defenses to target.<sup>11</sup>

Unlike the B-1, the cruise missile was comparatively inexpensive. A single ALCM cost \$1 million to produce, meaning that large quantities of the weapons could be fielded at relatively low costs. The Brookings study

concluded that by favoring the stand-off cruise missile option, the Air Force would be able to field thousands of cruise missiles and overwhelm Soviet air defenses in the event of a nuclear strike. Because of their lethality, every single incoming missile would have to be targeted. If equipped with a decoy package mimicking the radar signature of a bomber, defenders would have no way of knowing if they were targeting a single warhead cruise missile or a fully armed bomber.

A subsequent report by Archie L. Wood, one of the co-authors of the original Brookings study, analyzed a second option for upgrading the bomber force: arming the existing B-52 fleet with cruise missiles. In 1976, 355 B-52s were operational, and each could be outfitted with up to 20 cruise missiles. By the mid 1980s, when the ALCM came online, "about 4,000 weapons with a yield equivalent of about 1,400 megatons" could be added to the force.<sup>12</sup>

The report found that "a stand-off force relying on a large number of identical cruise missiles, with very small radar cross sections, flying at extremely low altitudes is very insensitive to the advent of look-down shoot-down area defenses. The B-1 would have to take complicated, expensive and relatively uncertain countermeasures such as ECM and decoys."<sup>13</sup>

The B-1 would almost certainly lose its penetration capabilities over time as air defenses continued to advance. In contrast, the stand-off option offered a long term solution to this problem. As air defenses improved, additional cruise missiles could be produced cheaply, relying on overwhelming numbers to defeat even the most sophisticated air defenses.

## Carter Cancels B-1, Reagan Revives It

By 1977 public opinion had turned against the B-1. Jimmy Carter, who won the presidential election in 1976, had run on a platform opposing the B-1 bomber. The plane, he said, was too costly and ultimately unable to provide capabilities that the B-52 with a standoff option could not. Furthermore, as commander in chief, Carter had access to top secret information, so he knew the development of a stealth bomber, the B-2, was underway. The new plane was expected to enter the force by 1990, and until then, Carter was convinced that the B-52 armed with cruise missiles was sufficient for U.S. defense. Later that year he made the executive decision to cancel the B-1 program.

But Carter's decision to cancel the B-1 had been left deliberately vague in order to leave wiggle room to resurrect the B-1 if the cruise missile option didn't pan out. Congressional appropriators kept the B-1 on life support, feeding the program a few million dollars annually. Rather than abandoning the concept of the penetrating bomber, the Air Force quietly shifted tactics.

Instead of conceding one program in favor of the other, the Air Force began to lobby for both. Having a fleet of stand-off capable B-52s and the penetrating B-1 bomber, they argued, would provide the bomber fleet with maximum flexibility and a wider array of options for waging a strategic nuclear war. The Air Force hoped to overwhelm Soviet air defenses by forcing them to expend massive amounts of resources on defending against both types of threats. This played well with conservative members of Congress who were determined to outpace Soviet military spending.

In 1979 the U.S.-backed Shah of Iran was toppled in a revolution, and the U.S. embassy in Tehran was overrun. Fifty-two Americans were held hostage for 444 days, and Carter's failure to secure their release is widely perceived as one of the main reasons he lost the 1980 presidential election to Ronald Reagan. In contrast to Carter, Reagan promised to significantly increase U.S. defense spending to defeat the Soviets. Endorsing the B-1 fit this agenda, and in 1981

Reagan brought the program back to life, ordering full scale production of 100 aircraft.

In reality, there was no capability gap for the B-1 to fill. According to declassified cables, the CIA had intimate knowledge of Soviet air defenses starting in 1979.<sup>14</sup> That year, Adolf Tolkachev, a Soviet engineer, became a spy for the CIA; he provided blueprints and schematics of Soviet aircraft, missile defenses and radar capabilities. The documents provided by Tolkachev proved that the Soviets had not yet developed look-down shoot-down radar, which would have allowed them to detect low-flying objects that traditional radar stations could not. Short of visual confirmation, the Soviets were blind to anything flying at altitudes below 1,000 feet. Not only would the Soviets be completely vulnerable to an onslaught of incoming cruise missiles, but the B-52s, which by that time had been modified to operate at low altitudes, could fly below the Soviet radar ceiling and reach targets in the Soviet Union.

The insight into the capabilities of the Soviet air defense network lasted until 1985, when Tolkachev was caught by the Soviets, charged with espionage and executed. Reagan's decision to resume the B-1 bomber program raises questions that are perhaps best explained by his predecessor. In his 2010 book *White House Diary*, Jimmy Carter wrote: "Under pressure from lobbyists and the defense establishment,



AGM-86B cruise missiles being loaded on to the external pylon of a B-52 bomber.

President Reagan later reversed my decision to cancel the B-1 bomber. The older B-52s with air-launched cruise missiles could perform the same mission at one-twentieth the cost, and our 'secret' B-2 stealth technology (invisible to radar) was in the planning stage. The B-1s were not necessary, and we wasted \$10 billion on a hundred of them."<sup>15</sup>

## Replacing the Replacements: The B-2 and the ACM

In the end, this "belt and suspenders" approach to the bomber debate won the day, and the Air Force dodged its obligation to prioritize. Air-launched cruise missiles were deployed on the B-52 in 1982, and in 1983 the B-1 entered the force. When Tolkachev was caught in the mid 1980s, the trove of information he provided about Soviet air defenses came to a halt. But the documents and drawings he had supplied "revealed sensitive plans for research on weapons systems a decade into the future."<sup>16</sup> The CIA knew full well that the United States would dominate the skies if war broke out with the Soviet Union, and the Soviets had no prospect of altering the status quo. Despite this knowledge, plans for the B-2 moved forward without delay, and the Air Force launched a project to build an even more sophisticated cruise missile.

When it was first pitched to Congress, the B-2 was described as a revolution in military aviation. While the B-1 had a small radar cross section, the B-2 fully incorporated low-observable technology (LOT), which made it extremely difficult for enemy radar to detect. The plane's unique shape, skin material and intake and output ports gave it this capability, but at a significant cost. Original estimates for the B-2 were \$532 million per plane, significantly more than the cost of both the B-52 and the B-1 bomber. Measured in 1989 dollars, the B-52 cost \$45 million per unit, and the B-1 cost \$213 million.

Given the continued viability of the B-52 and the brand new B-1, there was little reason to add another bomber to the mix. As former Secretary of Defense William Cohen, who was a senator at the time, wrote in 1989, "while it may make sense to acquire a new bomber force once every two to three decades, it is quite another matter to buy two new bomber forces within a single decade."<sup>17</sup>

Initial plans called for 132 B-2s to be produced and for the old B-52s to be phased out on a one-for-one replacement basis with the new plane. The nuclear cruise missile was also supposed to be retired along with the B-52. Since the

ALCM had been designed to extend the life of the B-52 fleet, the B-2 was not designed to carry it.

The Reagan administration reversed these plans. While continuing to embrace the B-1 and the B-2, the Air Force decided that it needed an even more sophisticated nuclear cruise missile than the ALCM, one that had a longer range and incorporated stealth technology. In 1982 the Air Force started development of the AGM-129 Advanced Cruise Missile (ACM), and the first missiles were delivered to the Air Force in 1990, with plans to produce 2,000 of them.

These plans never came to full fruition. In 1989 the Berlin wall fell, and in 1991 the Soviet Union officially dissolved. The enemy that the B-2 and ACM had been designed to defeat had ceased to exist. The country that succeeded the USSR, the Russian Federation, was not as hostile to the West. Boris Yeltsin, the first president of Russia, even spoke of joining the NATO alliance in 1991.<sup>18</sup>

Faced with this new geopolitical reality, Secretary of Defense Dick Cheney cut the B-2 buy from 132 to 75 aircraft. In 1992, President George H. W. Bush made even further reductions, announcing that only 21 of the new bombers would be built. The cutback meant that economies of scale were lost, and by 1998 the cost of a single B-2 had soared to more than \$2.1 billion.<sup>19</sup> It became the most expensive aircraft in the world. The reduced number of B-2 bombers was far too low to replace the B-52 on a one-for-one basis, so the B-2 became an addition to the existing bomber fleet, rather than a replacement for the B-52.

The decision to slash the B-2 acquisition numbers was further vindicated by a 1993 Government Accountability Office (GAO) review, which concluded that "in further examining the rationales supporting the need for the B-2, we found that the Soviet air defense threat, like the B-52's obsolescence, had been overestimated. Evaluation of the data over the period 1972-1991 showed this clearly with regard to both the number and the effectiveness of Soviet air defenses against existing U.S. bombers and their weapons... In short, the Soviet air defense threat that the B-2 had been created to address was never in fact deployed."<sup>20</sup>

The same GAO review also found that the improvement in range offered by the ACM "was only slightly greater than the older ALCM's demonstrated capability" and that "the improvement in accuracy offered by the ACM appears to have little operational significance."<sup>21</sup> Consequently, of the 2,000 ACMs planned, only 460 missiles were



# The Case Against the Cruise Missile

produced between 1990 and 1993. By 2007 the second Bush administration decided to unilaterally retire the ACM entirely, in favor of retaining the older ALCM.<sup>22</sup>

Now that the Air Force has decided to build a new penetrating bomber, the B-21, it has undermined its case for a new nuclear air-launched cruise missile. But redundancy is just the start of the Long-Range Stand-Off weapon’s (LRSO) problems.

## New Cruise Missile is Unnecessary

Cruise missiles and penetrating bombers were never meant to be used together, and are redundant capabilities. Once the bombers have reached their target, they need gravity bombs that can be dropped from above, not nuclear cruise missiles that are shot from afar.

Moreover, the capability of conventional cruise missiles has advanced significantly since the nuclear cruise missile was designed in the late 1970s. Back then, Cold War planners were convinced that they needed the ALCM to reliably destroy hard-to-kill targets. That is no longer the case.<sup>23</sup>



The newest conventional cruise missile, the Joint Air-to-Surface Standoff Missile-Extended Range (JASSM-ER), is capable of destroying the same targets as the ALCM.<sup>24</sup> Armed with a 1,000-pound class, hardened, earth-penetrating warhead, the JASSM-ER can destroy soft, medium and hardened targets with a high degree of accuracy. The latest model of the missile is compatible with the Counter-electronics High Power Microwave Advanced Missile Project (CHAMP) payload, a sophisticated electronic warfare package that enables it to knock out enemy electronic equipment. The

	LRSO	JASSM-ER
Potential Targets	“With stand-off [LRSO] I can make holes and gaps to allow a penetrating bomber to get in... Ultimately I’d like to be able to get to the ability where I could do direct attacks anywhere on the planet to hold any place at risk.” <sup>27</sup>	“JASSM provides both fighter and bomber aircraft the capability to strike critical, high value, heavily defended targets early in a campaign.” <sup>28</sup>
Penetration Ability	“Without the LRSO our most comparable response option would require an aircraft carrying gravity bombs to overfly its target, putting both crew and mission at significant risk.” <sup>29</sup>	“This missile can fly into heavily defended areas so our aircraft don’t have to.” <sup>30</sup>
Deterrence Value	“The LRSO will... preserve the ALCM’s essential contribution to the range of strike options the President has for responding to a limited or large scale failure of deterrence.” <sup>31</sup>	“The missiles [JASSM and JASSM-ER] delivered under Lot 13 will provide an effective and more affordable capability against Anti-Access/Area Denial threats, thus providing a strategic deterrent for U.S. and international warfighters.” <sup>32</sup>



JASSM-ER is already operational on the B-1 bomber, and over the next decade it will be integrated on the B-2 and B-52 bomber, as well as F-15E and F-16 fighter-bombers.<sup>25</sup>

The JASSM-ER's flexibility and lethality have earned it high praise in the halls of the Pentagon. After a successful test of the new cruise missile in 2014, Kenneth Brandy, the JASSM-ER test director, said, "While other long range weapons may have the capability of reaching targets within the same range, they are not as survivable as the low observable JASSM-ER... The stealth design of the missile allows it to survive through high-threat, well-defended enemy airspace. The B-1's effectiveness is increased because high-priority targets deeper into heavily defended areas are now vulnerable."<sup>26</sup>

A side-by-side comparison of language used by defense officials to describe the missions of the nuclear LRSO and the conventional JASSM-ER shows striking similarities.

Both missiles are described as penetrating weapons, capable of surviving air defense systems and keeping the bomber force out of harm's way with its ability to "fly into heavily defended areas so our aircraft don't have to." Both platforms are said to add significant capabilities to the strategic deterrence mission. However, if deterrence fails, the President could use the JASSM-ER to destroy high-value military targets, without triggering the political and military consequences that would result from nuclear use. In fact, the Air Force is already using the JASSM-ER in the United States Strategic Command's (STRATCOM) annual nuclear strike exercise.

In the highly unlikely event that a situation arose which did require the use of long-range stand-off nuclear weapons, other weapons, such as nuclear-armed submarine-launched ballistic missiles could be used instead.

## Nuclear-Armed Cruise Missiles are Destabilizing

Former Secretary of Defense William J. Perry is a vocal opponent of the new nuclear cruise missile. During the Carter administration, Perry earned the nickname "ALCM Bill" for his role in the creation of the air-launched cruise missile. Replacing the ALCM with the LRSO, he argues, is a terrible idea. He explains in an op-ed written with former Assistant Secretary of Defense and former Director of the Nuclear Weapons Council Andy Weber, "Because they can be launched without warning and come in both nuclear

and conventional variants, cruise missiles are a uniquely destabilizing type of weapon."<sup>33</sup> An enemy, they write, would have no way of knowing if it were facing conventional or nuclear attack, which could lead to grave miscalculations that could escalate to nuclear war.

The United Kingdom, facing the same dilemma, decided to forgo building a sea-based nuclear cruise missile three years ago. Philip Hammond, then-British defense secretary, wrote, "A cruise-based deterrent would carry significant risk of miscalculation and unintended escalation. At the point of firing, other states could have no way of knowing whether we had launched a conventional cruise missile or one with a nuclear warhead. Such uncertainty could risk triggering a nuclear war at a time of tension."

It is in America's interest to minimize that risk. According to official policy, the primary purpose of U.S. nuclear weapons is to prevent their use.<sup>34</sup> As President Ronald Reagan said in his 1986 State of the Union address, "A nuclear war cannot be won and must never be fought."<sup>35</sup>

Yet official justifications for the new nuclear cruise missile suggest that there is a use for the LRSO short of all-out nuclear war. In 2014, Frank Kendall, the Pentagon's top acquisition chief, wrote to the Senate Appropriations Committee stating that "beyond deterrence, an LRSO-armed bomber force provides the President with uniquely flexible options in an extreme crisis, particularly the ability to signal intent and control escalation."<sup>36</sup>

**"Anyone who thinks they can control escalation through the use of nuclear weapons is literally playing with fire. Escalation is escalation, and nuclear use would be the ultimate escalation."**

The type of scenario Kendall mentions is commonly referred to as "escalation control." This strategy seeks to de-escalate a conflict through the use of low-yield nuclear weapons. Doing so would theoretically convince an adversary that the cost of escalating to wider nuclear use would outweigh the benefits.

But any use of nuclear weapons carries with it the risk of escalation to much wider nuclear use. Criticizing Russian nuclear doctrine that envisions an early first use of a nuclear weapon in a conflict, Deputy Secretary of Defense Robert Work noted that "anyone who thinks they can control escalation through the use of nuclear weapons is literally

playing with fire. Escalation is escalation, and nuclear use would be the ultimate escalation.”<sup>37</sup> Yet that is precisely the mission that the Air Force wants for the new nuclear air-launched cruise missile.

The notion that a limited nuclear war is winnable contradicts decades of U.S. deterrence policy and has prompted members of Congress to express serious concern. After a briefing on the necessity of the new nuclear air-launched cruise missile, Senator Dianne Feinstein (D-CA) said that she “came away unconvinced of the need for this weapon. The so-called improvements to this weapon seemed to be designed candidly to make it more usable, to help us fight and win a limited nuclear war. I find this a shocking concept.”

The LRSO would use a modified version of the W80 nuclear warhead, which is used on the ALCM and has a variable yield of 5 or 150 kilotons. The LRSO will reportedly include a “dial-a-yield” feature, which would allow the operator to adjust the explosive yield of the warhead anywhere within that range.<sup>38</sup> Gen. James E. Cartwright, retired vice chairman of the Joint Chiefs of Staff, warns that “going smaller” with nuclear yield makes “the weapon more thinkable.”<sup>39</sup>

Lower-yield options could make military planners more likely to recommend using the LRSO to “surgically” strike high-value military targets in order to create less radioactive fallout and civilian damage. But although a lower-yield weapon would be less “dirty” than a higher-yield weapon, there is no such thing as a clean nuclear attack. A 2004 report from the Congressional Research Service found that “a 5-kiloton weapon detonated near and upwind from Damascus, Syria, at a depth of 30 feet would cause 230,000 fatalities and another 280,000 casualties within two years. Use of a low-yield earth penetrator against the bunkers thought to house Saddam in Baghdad, a city of nearly 5 million people, could have caused casualties on a similar scale.”<sup>40</sup>

Attempting to limit or reverse escalation with low-yield nuclear weapons could have the opposite effect, spiraling out of control, and sparking a nuclear war that could kill millions.

During the Cuban Missile crisis, President John F. Kennedy was worried that merely boarding Soviet ships would prompt the USSR to launch an all-out nuclear strike. It is difficult to imagine that a nuclear power would respond to limited nuclear use with anything less than a nuclear attack of its own.

The little data that we do have supports this theory. In 1983, the Pentagon sponsored a wargame, codenamed

Proud Prophet, that began with a political crisis in the Mediterranean. Following current strategies and war plans in a face-off with the Warsaw Pact, the NATO alliance attempted to “demonstrate resolve, hold its ground and de-escalate the confrontation.”<sup>41</sup> Tit-for-tat escalation led the American team to launch limited nuclear strikes in an attempt to convince the Soviet team to stand down. This went terribly wrong. The Soviets launched the majority of their nuclear arsenal in retaliation. The Americans responded in kind. Half a billion people died as a direct result of the exchange, and at least that many were killed in the aftermath.<sup>42</sup>

In an effort to prevent the development of more a “useable” nuclear option, the 1994 National Defense Authorization Act included a provision prohibiting the research and development of nuclear weapons with yields of less than 5 kilotons. Although the provision was ultimately repealed, the logic behind the ban remains sound. While defending the provision during a congressional debate in 2003, Senator Ted Kennedy (D-MA) argued, “A mini-nuke is still a nuke... If we build it, we will use it. It is a one-way street that can only lead to nuclear war.”<sup>43</sup>

Aside from the millions of people who would die in a large-scale nuclear exchange between Russia and the United States, many more lives could be lost as a result of global famine. According to experts, roughly 150 million tons of smoke would be lifted into the upper atmosphere, reducing precipitation by 45 percent and causing temperatures to drop by 7 to 8 degrees Celsius for several years. This would likely cause “the worldwide collapse of agriculture” and “the loss of transportation and energy production.”<sup>44</sup>

Even a limited nuclear exchange where 100 15-kiloton warheads were used would have devastating effects. Clouds of dust, dirt and debris would cause “the coldest average surface temperatures in the last 1,000 years.”<sup>45</sup> Growing seasons would be reduced by 10 to 40 days per year, causing severe damage to agriculture and aquatic ecosystems. Up to a billion people could die from starvation.

Beyond the direct implications of its use, fielding a new nuclear air-launched cruise missile threatens to upset the balance of power that nuclear weapons states have spent the last 70 years trying to build. Much of global nuclear weapons policy is based on the notion of mutually assured destruction. That is, convincing potential adversaries that a nuclear attack would guarantee a devastating response. Stability then, “is said to exist when both sides are assured that their forces can survive a surprise attack and that



A B-2 bomber during aerial refueling.

decisions about response options can be made and implemented in a postattack environment.”<sup>46</sup>

During the Cold War, the United States and the Soviet Union actively sought to avoid developing weapons that eliminate meaningful warning time. Such weapons could be used to cripple an adversary’s nuclear forces before they could retaliate. For example, the non-stealthy nature of the B-52/ALCM combination meant that it could easily be tracked by radar, rendering it useless in a surprise attack on enemy nuclear forces.

The new nuclear air-launched cruise missile represents a reversal in that policy. The missile will likely incorporate the latest stealth technology and will be equipped on the new B-21.<sup>47</sup> Putting a low-observable cruise missile on a low-observable bomber sends a dangerous signal to states that see themselves as potential targets of a surprise first strike by the United States.

In fact, very little attention has been paid to how potential adversaries would perceive the new nuclear air-launched cruise missile. This is a glaring omission considering that deterrence theory relies exclusively on the calculus of one’s opponent. As Christine Parthemore and Vikram Singh of the Center for American Progress recently explained, “Effective

deterrence is more complex than simply having a nuclear capability to hold at risk every target one player in the relationship deems worthy. It also requires the hard work of ensuring that U.S. nuclear weapons investments are read as we intend them to be by potential adversaries.”<sup>48</sup>

Across the board, nuclear weapons states are investing heavily in programs to enhance the lethality of their nuclear arsenals. If the LRSO is perceived to shift the balance of power in favor of the United States, they will almost certainly redouble their efforts in an attempt to balance the scales. This type of tit-for-tat reactionary posturing could substantially contribute to a new arms race that would ultimately undermine U.S. national security interests.

## The New Nuclear Cruise Missile is Unaffordable

During the coming years, the Department of Defense (DoD) faces serious budgetary challenges that are a result of the spending limits dictated by the Budget Control Act (BCA) of 2011. The BCA put in place roughly \$1 trillion in cuts to defense spending over the next decade (in then-year





An AGM-86B cruise missile during a flight test.

dollars). But at the same time that the DoD is supposed to be reducing its spending, it planned extensive replacement programs for all three legs of the triad, as well as upgrades to conventional forces. All of these programs will reach their spending peaks at roughly the same time in the mid 2020s, creating a spike in spending that experts commonly refer to as a “bow-wave.” This bow-wave will exceed the caps that Congress has established for defense spending, bringing the DoD’s plans in direct conflict with current legislation.<sup>49</sup>

Pentagon Acquisition Chief Frank Kendall has made the same observation. He said that as nuclear replacement programs, including the B-21, ramped up in the in the mid 2020s, “we’re going to have an affordability problem that we’ll have to deal with.”

A recent report from the Center for Strategic and International Studies found that the Air Force is the greatest contributor to the bow-wave. The costs of major Air Force acquisition programs are projected to grow by 73 percent from 2015 to 2023. The largest programs in the Air Force budget by far are the nuclear-capable F-35A Joint Strike Fighter and the B-21. During the same time frame when the cost of these programs will peak, the Air Force is planning to fund several other major aircraft acquisition projects. The result is that the cost for aircraft acquisition will peak in 2023 at nearly twice the level of funding for 2015, adjusting for inflation.<sup>50</sup>

The cost of producing the B-21 alone will likely exceed \$111 billion, assuming everything goes according to plan.<sup>51</sup> If the historical trajectory of cost overruns in the Air Force is any indication, that’s not going to happen. The B-21 program will put tremendous strain on the Air Force budget.

“The Air Force recognizes [that] if they buy 100 new strategic bombers in the mid 2020s, they are going to lose half of their fighter wings,” notes Amy Woolf, an expert in nuclear weapons policy at the Congressional Research

Service.<sup>52</sup> That problem arises even before factoring in the \$30 billion cost of the LRSO program.<sup>53</sup>

To try to solve this dilemma, Secretary of the Air Force Deborah Lee James has proposed establishing a national deterrence fund to pay for the B-21. This is a not a new concept. In 2015, the Navy asked for its own national deterrence fund to pay for the Ohio submarine replacement program.

But these proposals fail to address the underlying problem. Congress needs to appropriate funds for the account to function, something it has declined to do. To cite Kendal, “at the end of the day we have to find money to pay for these things one way or another, right? So changing the accounting system doesn’t really change that fundamental requirement. We still need the money and it has to come from somewhere.”<sup>54</sup>

Canceling the new nuclear cruise missile would free up funds in the budget and help the Air Force reduce the size of its bow-wave. As Perry and Weber put it, “There is scant justification for spending tens of billions of dollars on a new nuclear air-launched cruise missile... We can, and should, maintain an extremely effective bomber leg of the triad without it.”<sup>55</sup>

## Nuclear Cruise Missile Not Needed for Bomber Counting Rule

The Air Force argues that it needs a new nuclear cruise missile to be able to take advantage of an arcane counting rule in the 2010 New START treaty. Under that treaty, heavy bombers are counted as one warhead, regardless of how many weapons the aircraft can actually carry. This means that a B-52 bomber carrying a full load of 20 ALCMs (which are single warhead weapons), can carry up to 19 warheads that do not count towards treaty limits. Given that the United States has committed to maintain a fleet of no more than 60 bombers, the Air Force can theoretically field hundreds of warheads above the treaty cap of 1,550. Air Force officials claim that failure to take advantage of this counting rule would give the Russians a significant upper hand in the amount of nuclear weapons it could deploy.

This argument is incorrect. Even if the LRSO were canceled, the United States could still take advantage of this treaty loophole by loading each of the 60 nuclear bombers with B-61 nuclear gravity bombs. All current U.S. bombers are capable, or can be made capable, of carrying the B-61.<sup>56</sup>



Moreover, claiming that the nuclear air-launched cruise missile is needed to take advantage of the New START counting rule assumes that the United States needs more deployed nuclear warheads than the 1,550 allowed by New START. It does not.

The Pentagon informed Congress in 2012 that the “Russian Federation... would not be able to achieve a militarily significant advantage by any plausible expansion of its strategic nuclear forces, even in a cheating or breakout scenario under the New START Treaty, primarily because of the inherent survivability of the planned U.S. strategic force structure, particularly the Ohio-class ballistic missile submarines, a number of which are at sea at any given time.”<sup>57</sup> Rather than needing more weapons, the 2013 Nuclear Employment Strategy found that the United States could meet its national and international security commitments with up to one-third fewer nuclear weapons deployed.<sup>58</sup>

## Time for A Global Ban on Nuclear Cruise Missiles

Proceeding with a new nuclear air-launched cruise missile presents numerous risks and little payoff. Conversely, canceling the nuclear cruise missile would not weaken the air leg of the triad. In fact, according to Parthemore and Singh, “in terms of international perception, cutting or delaying the LRSO could be conveyed as a position of strength, determination, and leadership by the United States.”<sup>59</sup>

In light of Russia’s recent invasion of eastern Ukraine and nuclear saber rattling, it would be an opportune moment for the United States to send a clear message that nuclear weapons play no role in dealing with Russia’s aggression. Foregoing the LRSO would demonstrate America’s commitment to avoiding nuclear provocations and escalation, and it would also serve as an important reminder to the international community that the United States intends to meet its long-term disarmament obligations under the Non-Proliferation Treaty. A U.S. decision to cancel the LRSO could also lay the foundation for a global ban on nuclear-armed cruise missiles.

As Perry and Weber point out, the dual-use nature of nuclear cruise missiles makes them uniquely destabilizing. Because the target of a cruise missile attack has no way of knowing if it is under conventional or nuclear attack, the existence of nuclear cruise missiles unnecessarily adds a level of uncertainty to international politics. That uncertainty could lead to grave miscalculations that would trigger a nuclear war at a time of tension.

Ronald Reagan and Mikhail Gorbachev recognized the dangers posed by nuclear cruise missiles when they joined together to eliminate ground-launched versions in the 1987 Intermediate-Range Nuclear Forces (INF) Treaty. Sea-launched nuclear cruise missiles were not covered by the treaty, but the United States and Russia offloaded them from ships and submarines in 1992. Russia still has nuclear-capable sea-launched cruise missiles, but the United States unilaterally retired its last sea-launched nuclear cruise missile in 2011.

By moving forward with plans to develop the LRSO, the United States is missing an opportunity to curtail proliferation and eliminate the threat that nuclear cruise missiles pose to global security. The United States, Russia, France and Pakistan are the only countries that currently deploy nuclear-tipped cruise missiles. If the United States leads by example by eliminating its nuclear-armed cruise missiles, other states that possess them could follow suit.

- Russia has several types of nuclear sea-launched anti-ship and land-attack cruise missiles as well as air-launched cruise missiles.
- China has a ground-launched cruise missile that the U.S. Air Force estimates is nuclear-capable, although it is not clear that a nuclear version has actually been deployed.
- France has recently deployed an enhanced air-launched nuclear cruise missile and is working on a future version.
- Pakistan has started deployment of a ground-launched nuclear cruise missile, is developing a nuclear air-launched cruise missile and is working on a nuclear sea-launched cruise missile as well.

It is believed that China does not currently deploy nuclear-armed cruise missiles. But China has the resources and technology to do so, which would be a serious threat to U.S. forces and allies in the region. If China were given a guarantee that potential adversaries would relinquish their nuclear-armed cruise missiles, it is possible that they would opt to forgo a weapon that they do not have, in return for a more stable global threat environment.

Russia has a stake in preventing China’s development of nuclear cruise missiles. Russia and China share a long border that has been a source of tension between the two countries. Only Russia and the United States are party to the INF treaty banning ground-launched nuclear cruise missiles. China is currently under no obligation to forgo that option.

Like China, India and Pakistan are not parties to the INF treaty, and Pakistan is well underway in developing a diverse arsenal of nuclear cruise missiles that might motivate India to develop similar weapons. The contested Kashmir Valley between the two rivals is already considered one of the most dangerous places on earth. Given Russia's close proximity to India and Pakistan, if a nuclear shooting war breaks out, Russia could suddenly find itself on the front lines.

As Russia has heavily invested in a nuclear triad of ICBMs, submarines and bombers, eliminating nuclear cruise missiles would be a small price for Russia to pay for the benefit of negating a significant threat to Moscow's security. Doing so would also eliminate the dangerous irritant presented by Russia's alleged development and testing of a new ground-launched nuclear cruise missile.

A move to ban nuclear cruise missiles would likely be supported by America's European allies. Proponents of the LRSO frequently claim that fielding a weapon tailored for escalation control would reassure U.S. allies. However, former Director of the Nuclear Weapons Council Andy Weber says, "The opposite is true. Countries like Germany are not excited to hear U.S. loose talk about fighting limited nuclear wars with the LRSO on their territory."<sup>60</sup>

The INF treaty sought to mitigate the risks of a limited nuclear war in the European theater by removing ground-launched nuclear cruise missiles entirely. Fielding the LRSO could reverse that progress, says Weber. "The advocates of replacing the air-launched cruise missile... the reasons they cite for needing it are essentially tactical, limited, nuclear war fighting scenarios... That talk disturbs some of our allies in Europe and in East Asia."<sup>61</sup>

## Recommendations for the President

As President Obama nears the end of his last term in office, here are two concrete steps he can take to improve U.S. and global security:

- Cancel the LRSO missile and W80 warhead refurbishment program
- Propose a global ban on nuclear-armed cruise missiles

The option to cancel the LRSO presents President Obama with a chance to take the lead on instituting a global ban on nuclear-armed cruise missiles. It would be a meaningful

step toward fulfilling his nuclear promises and improving global security.

In 2009, Obama delivered a speech in Prague detailing his commitment to move towards "a world free of nuclear weapons" and reduce the role of nuclear weapons in U.S. national security strategy.

The president's commitment was codified in the 2010 Nuclear Posture Review, which clearly stated that "major improvements in missile defenses, and the easing of Cold War rivalries — enable us to fulfill those objectives at significantly lower nuclear force levels and with reduced reliance on nuclear weapons."<sup>62</sup>

In 2013, Obama announced that he would pursue an additional one-third bilateral reduction in warhead levels beyond those dictated in New START. But this has not happened.

In the seven years since the Prague speech, the hopes of arms control proponents and some of the president's closest advisors have turned to "baffled disappointment as the modernization of nuclear capabilities has become an end unto itself."<sup>63</sup> Rather than reducing America's reliance on nuclear weapons, the Obama administration has increased it, with a \$1 trillion plan to replace all three legs of the triad and add new capabilities to nuclear weapons systems.

This runs directly counter to Obama's pledge that "the United States will not develop new nuclear warheads or pursue new military missions or new capabilities for nuclear weapons."<sup>64</sup>

With top of the line stealth technology, the LRSO would be far more capable than its predecessor. Adding additional yield options would allow military planners to use the LRSO in missions that could not be undertaken by the ALCM.

"A lot of it is hard to explain," says former Senator Sam Nunn (D-GA), whose work on nuclear reductions heavily influenced Obama's thinking on nuclear weapons early in his presidency. "The president's vision was a significant change in direction. But the process has preserved the status quo."<sup>65</sup> One of the reasons that the president has been unable to deliver on his nuclear promises is Russia's invasion of eastern Ukraine. According to Gary Samore, a former top nuclear policy advisor to Obama, "that has made any measure to reduce the stockpile unilaterally politically impossible."<sup>66</sup>

It is also why canceling the LRSO would be a politically savvy move on Obama's part. Doing so would allow him to point to tangible progress in his vision for a future free of

nuclear weapons, without making reductions in warhead levels or eliminating a leg of the triad.

Canceling the new nuclear cruise missile is the smart thing to do from a national security and budgetary standpoint. Using the LRSO's cancellation as a stepping stone toward global elimination of a class of nuclear weapons, Obama can strengthen America's national security by reducing the risk of an accidental nuclear war.

## Conclusions

The debate about whether to replace the ALCM with a new nuclear cruise missile has roots that date back almost 50 years. But the geopolitical environment, and thus the "need" for the missile, has changed dramatically. When President Carter approved the original Air-Launched Cruise Missile in the 1970s it was envisioned as a solution to the vulnerability of bombers that could not penetrate enemy airspace. That reality has changed significantly.

The United States fields the most sophisticated bomber force in the world, and its stealth bombers give it the ability to penetrate the most contested air defenses in the world. That capability will be enhanced by the addition of the B-21 to the force in 2025. There is no reason to put nuclear cruise missiles, whose purpose is to evade air defenses, on bombers tailored to evade air defenses. This is redundant, and in fact has never been done before. Penetrating bombers and nuclear air-launched cruise missiles are alternatives to each other. Using them together is not worth the cost.

The Air Force cannot afford to recapitalize its nuclear weapons systems as well as its conventional forces within existing budgetary limitations. The Air Force itself recognizes as much. If the Air Force is going to be able to afford the high priority items on its wish list, such as the B-21, it cannot afford redundancy.

There is no unique mission for the nuclear cruise missile. Non-nuclear cruise missiles can take on the same missions, and if a nuclear option is needed, other nuclear weapons in the U.S. arsenal can be called upon. Canceling the \$30 billion LRSO would free up valuable resources and allow the Air Force to acquire the tools that it needs to meet the challenges of 21st-century warfare.

Replacing the nuclear cruise missile is not only wasteful, it is dangerous as well. Military planners who favor the

LRSO argue that it is needed to threaten adversaries with a "limited" nuclear war. But even a limited nuclear exchange could kill hundreds of thousands instantaneously. The resulting atmospheric changes could spark a global famine killing millions. Because cruise missiles come in conventional and nuclear variants, they also increase the risk of an accidental nuclear launch. A targeted adversary would have no way of knowing if the attack were nuclear or conventional. In a crisis situation, this could complicate an adversary's response and trigger a nuclear war.

The instability posed by the existence of nuclear-armed cruise missiles has global ramifications. It would benefit all nuclear-armed powers to see them become a thing of the past. President Obama can strengthen American security by canceling the new nuclear cruise missile and taking the lead on eliminating a weapons platform that adversely impacts global security. Rather than investing in military capabilities that are designed to fight the ghosts of the Cold War, the United States should rethink its security strategy based on the tools it needs to address the threats of the 21st century.

## Notes

- 1 "B-52 Stratofortress History," Fas.org, February 1, 1998, [http://fas.org/nuke/guide/usa/bomber/b-52\\_hist.htm](http://fas.org/nuke/guide/usa/bomber/b-52_hist.htm).
- 2 James F. Dunnigan and Albert A. Nofi, *Dirty Little Secrets of the Vietnam War: Military Information You're Not Supposed to Know* (New York: Thomas Dunne Books, 1999), pg. 131.
- 3 "AGM-28A Hound Dog," Fas.org, June 2, 1997, <http://fas.org/nuke/guide/usa/bomber/agm-28.htm>.
- 4 Deborah Shapley, "The B-1 and the Cruise Missile: To Have and Have Not," *Science* 193, no. 4250 (July 23, 1976): pg. 304.
- 5 Ibid.
- 6 "B-1B Lancer," Fas.org, October 13, 1999, <http://fas.org/nuke/guide/usa/bomber/b-1b.htm>.
- 7 Shapley, *The B-1 and the Cruise Missile: To Have and Have Not*, pg. 304. "AGM-28A Hound Dog," Fas.org, June 2, 1997, <http://fas.org/nuke/guide/usa/bomber/agm-28.htm>.
- 8 Richard K. Betts, *Cruise Missiles: Technology, Strategy, Politics* (Washington, D.C.: Brookings Institution, 1981), pg. 369.
- 9 Alton H. Quanbeck and Archie L. Wood, *Modernizing the Strategic Bomber Force* (Washington, D.C.: Brookings Institution, 1976).
- 10 David C. Morrison, "Air-breathing Nuclear Delivery Systems," *Bulletin of the Atomic Scientists* 40, no. 2 (February 1984): pg. 36, doi:10.1080/00963402.1984.11459180.
- 11 Betts, *Cruise Missiles: Technology, Strategy, Politics*, pg. 47.
- 12 Archie L. Wood, "Modernizing the Strategic Bomber Force without Really Trying - a Case against the B-1," *International Security* 1, no. 2 (Fall 1976): pg. 101.
- 13 Ibid, pg. 115.
- 14 David E. Hoffman, *The Billion Dollar Spy: A True Story of Cold War Espionage and Betrayal*, 1st ed. (New York: Doubleday, 2015).
- 15 Jimmy Carter, *White House Diary* (New York: Farrar, Straus and Giroux, 2010), pg. 67.
- 16 Hoffman, *The Billion Dollar Spy: A True Story of Cold War Espionage and Betrayal*, pg. 1.
- 17 William S. Cohen, "The B-2 Bomber: Mission Questionable, Cost Impossible," *Arms Control Today*, October 1989, pg. 4.
- 18 Friedman, Thomas L. "Yeltsin Says Russia Seeks to Join NATO." *The New York Times*. December 20, 1991, <http://www.nytimes.com/1991/12/21/world/soviet-disarray-yeltsin-says-russia-seeks-to-join-nato.html>.
- 19 United States, General Accounting Office, National Security and International Affairs Division, *B-2 Bomber: Additional Costs to Correct Deficiencies and Make Improvements*, by David E. Cooper, Robert D. Murphy, Michael J. Hazzard, and Marvin E. Bonner (1998), pg. 2, <https://www.gpo.gov/fdsys/pkg/GAOREPORTS-NSIAD-98-152/pdf/GAOREPORTS-NSIAD-98-152.pdf>.
- 20 United States, General Accounting Office, Program Evaluation and Methodology Division, *The U.S. Nuclear Triad: GAO's Evaluation of the Strategic Modernization Program*, by Eleanor Chelimsky (Washington: General Accounting Office, 1993), pg. 5, <http://www.gao.gov/assets/110/105080.pdf>.
- 21 Ibid.
- 22 Hans M. Kristensen, "US Air Force Decides to Retire Advanced Cruise Missile," *FAS Strategic Security Blog*, March 7, 2007, [https://fas.org/blogs/security/2007/03/us\\_air\\_force\\_decides\\_to\\_retire/](https://fas.org/blogs/security/2007/03/us_air_force_decides_to_retire/).
- 23 Hans M. Kristensen, "Forget LRSO; JASSM-ER Can Do The Job." *FAS Strategic Security Blog*, December 16, 2015, <http://fas.org/blogs/security/2015/12/lrso-jassm/>.
- 24 Ibid.
- 25 Ibid.
- 26 Peter Thompson, "337th TES Assures JASSM-ER Carriage Capability," *Acc.af.mil*, January 15, 2014, [http://www.acc.af.mil/news/story\\_print.asp?id=123376707](http://www.acc.af.mil/news/story_print.asp?id=123376707).
- 27 Lt. Gen Stephen Wilson, Commander, Global Strike Command, AFGSC: *Five Years of Moving Forward*, June 24, 2014, <https://higherlogicdownload.s3.amazonaws.com/AFA/6379b747-7730-4f82-9b45-a1c80d6c8fdb/UploadedImages/Events/Heussy/062414afawilsondraft.pdf>.
- 28 Select Acquisition Report: Joint Air-to-Surface Standoff Missile (JASSM), As of FY 2015 President's Budget, [http://www.dod.mil/pubs/foi/Reading\\_Room/Selected\\_Acquisition\\_Reports/15-F-0540\\_JASSM\\_SAR\\_Dec\\_2014.PDF](http://www.dod.mil/pubs/foi/Reading_Room/Selected_Acquisition_Reports/15-F-0540_JASSM_SAR_Dec_2014.PDF).
- 29 Statement of Robert Scher, Assistant Secretary of Defense, before the House Armed Services Committee on Strategic Forces. April 15, 2015, <http://docs.house.gov/meetings/AS/AS29/20150415/103008/HHRG-114-AS29-Wstate-ScherR-20150415.pdf>.
- 30 Thompson, "337th TES Assures JASSM-ER Carriage Capability."
- 31 Scher, Statement before the House Armed Services Committee on Strategic Forces.
- 32 Lockheed Martin, "U.S. Air Force Awards Lockheed Martin \$305 Million Contract for JASSM and JASSM-ER Production," news release, October 15, 2015, <http://www.lockheedmartin.com/us/news/press-releases/2015/october/mfc-101515-us-air-force-awards-lockheed-martin-305-million-contract.html>.
- 33 William J. Perry and Andy Weber, "Mr. President, Kill the New Cruise Missile," *The Washington Post*, October 15, 2015, [https://www.washingtonpost.com/opinions/mr-president-kill-the-new-cruise-missile/2015/10/15/e3e2807c-6ecd-11e5-9bfe-e59f5e244f92\\_story.html](https://www.washingtonpost.com/opinions/mr-president-kill-the-new-cruise-missile/2015/10/15/e3e2807c-6ecd-11e5-9bfe-e59f5e244f92_story.html).
- 34 United States, Department of Defense, Office of the Secretary of Defense, *Nuclear Posture Review*, by Robert M. Gates (Washington: U.S. Dept. of Defense, 2010), [http://www.defense.gov/Portals/1/features/defenseReviews/NPR/2010\\_Nuclear\\_Posture\\_Review\\_Report.pdf](http://www.defense.gov/Portals/1/features/defenseReviews/NPR/2010_Nuclear_Posture_Review_Report.pdf).
- 35 Ronald Reagan, "Address Before a Joint Session of the Congress on the State of the Union," January 25, 1984, <http://www.presidency.ucsb.edu/ws/?pid=40205>.
- 36 Kristensen, "Forget LRSO; JASSM-ER Can Do The Job."
- 37 *The Role of Nuclear Weapons in U.S. National Security Strategy*, 114th Cong., 1 (2015) (testimony of Robert Work), <http://docs.house.gov/meetings/AS/AS29/20150415/103008/HHRG-114-AS29-Wstate-ScherR-20150415.pdf>.
- 38 Stephen Young, "Just How New Is the New, Nuclear-armed Cruise Missile?," *UCS All Things Nuclear Blog*, January 13, 2016, <http://allthingsnuclear.org/syoung/the-new-cruise-missile>.



- 39 Broad, William J., and David E. Sanger. "As U.S. Modernizes Nuclear Weapons, 'Smaller' Leaves Some Uneasy." *The New York Times*. January 11, 2016, [http://www.nytimes.com/2016/01/12/science/as-us-modernizes-nuclear-weapons-smaller-leaves-some-uneasy.html?\\_r=1](http://www.nytimes.com/2016/01/12/science/as-us-modernizes-nuclear-weapons-smaller-leaves-some-uneasy.html?_r=1).
- 40 United States, Congressional Research Service, National Defense Foreign Affairs, Defense, and Trade Division, *Nuclear Weapon Initiatives: Low-Yield R&D, Advanced Concepts, Earth Penetrators, Test Readiness*, by Jonathan Medalia (2004), pg. 23.
- 41 James Jay Carfano, "Avoiding the Unthinkable: Preventing a US-China Nuclear War," *The National Interest*, February 9, 2015, <http://nationalinterest.org/feature/avoiding-the-unthinkable-preventing-us-china-nuclear-war-12209>.
- 42 Paul J. Bracken, *The Second Nuclear Age: Strategy, Danger, and the New Power Politics* (New York: Henry Holt and, 2012), pg. 87-88.
- 43 Jonathan V. Ernest, *Nuclear Weapon Initiatives: Low-yield R & D, Advanced Concepts, Earth Penetrators, Test Readiness* (New York: Novinka Publications, 2005), pg. 26.
- 44 Alan Robock and Owen Brian Toon, "Self-assured Destruction: The Climate Impacts of Nuclear War," *Bulletin of the Atomic Scientists* 68, no. 5 (2012): pg. 70, doi:10.1177/0096340212459127.
- 45 Michael J. Mills et al., "Multidecadal Global Cooling and Unprecedented Ozone Loss following a Regional Nuclear Conflict," *Earth's Future* 2, no. 4 (April 1, 2014): pg. 161.
- 46 David S. Sorenson, "Stealth Bombers, Advanced Cruise Missiles, and Superpower Deterrence Stability," *Armed Forces & Society* 16, no. 3 (Spring 1990): pg. 407, doi:10.1177/0095327x9001600306.
- 47 Young, "Just How New is the New, Nuclear-armed Cruise Missile?"
- 48 Christine Parthemore and Vikram J. Singh, "Time to Internationalize the Dialogue on Nuclear Armed Cruise Missiles," *Warontherocks.com*, December 15, 2015, <http://warontherocks.com/2015/12/time-to-internationalize-the-dialogue-on-nuclear-armed-cruise-missiles/>.
- 49 Todd Harrison, *Defense Modernization Plans through the 2020s: Addressing the Bow Wave*, report (Washington: CSIS International Security Program, 2016), pg. 2, [http://csis.org/files/publication/160126\\_Harrison\\_DefenseModernization\\_Web.pdf](http://csis.org/files/publication/160126_Harrison_DefenseModernization_Web.pdf).
- 50 Ibid, pg. 8.
- 51 John M. Donnelly, "Wide Political Fallout Expected From Massive Nuclear Bomber Deal," *Roll Call*, July 29, 2015, [http://www.rollcall.com/news/wide\\_political\\_fallout\\_expected\\_from\\_massive\\_nuclear\\_bomber\\_deal-243131-1.html](http://www.rollcall.com/news/wide_political_fallout_expected_from_massive_nuclear_bomber_deal-243131-1.html).
- 52 Amy F. Woolf, "Nuclear Weapons Policy and Programs: The Role of Congress" (lecture, Nuclear Crossroads Initiative, Lawrence Livermore National Laboratory, Livermore), <https://cgsr.llnl.gov/event-calendar/2014/2014-10-16>.
- 53 Kristensen, "Forget LRSO; JASSM-ER Can Do The Job."
- 54 Tom Z. Collina, "The Unaffordable Arsenal," *Foreign Policy*, September 24, 2014, <http://foreignpolicy.com/2014/09/24/the-unaffordable-arsenal/>.
- 55 Perry and Weber, "Mr. President, Kill the New Cruise Missile."
- 56 Hans M. Kristensen, "Cruise Missile Replacement Plans," interview by author, March 17, 2016.
- 57 Hans M. Kristensen, "DOD: Strategic Stability Not Threatened Even by Greater Russian Nuclear Forces," *FAS Strategic Security Blog*, October 10, 2012, <http://fas.org/blogs/security/2012/10/strategicstability/>.
- 58 United States, Department of Defense, *Report on Nuclear Employment Strategy of the United States* (Washington, 2013), pg. 6, <http://www.globalsecurity.org/wmd/library/policy/dod/us-nuclear-employment-strategy.pdf>.
- 59 Parthemore and Singh, "Time to Internationalize the Dialogue on Nuclear Armed Cruise Missiles."
- 60 Andy Weber, "Internationalizing the Debate on Nuclear Armed Cruise Missiles." interview by author, February 18, 2016.
- 61 Ibid.
- 62 Gates, *Nuclear Posture Review*, pg. 5.
- 63 William J. Broad and David E. Sanger, "U.S. Ramping Up Major Renewal in Nuclear Arms," *The New York Times*, September 21, 2014, <http://www.nytimes.com/2014/09/22/us/us-ramping-up-major-renewal-in-nuclear-arms.html>.
- 64 The White House, Office of the Press Secretary, "Statement by President Barack Obama on the Release of Nuclear Posture Review," news release, April 6, 2010, [Whitehouse.gov](http://www.whitehouse.gov/the-press-office/2010/04/06/statement-president-barack-obama-release-nuclear-posture-review), <https://www.whitehouse.gov/the-press-office/2010/04/06/statement-president-barack-obama-release-nuclear-posture-review>.
- 65 Broad and Sanger, "U.S. Ramping Up Major Renewal in Nuclear Arms."
- 66 Ibid.

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