



Defense Primer: Strategic Nuclear Forces

The Nuclear Triad

Since the early 1960s the United States has maintained a “triad” of strategic nuclear delivery vehicles. These include long-range land-based intercontinental ballistic missiles (ICBMs), long-range submarine-launched ballistic missiles (SLBMs), and long-range heavy bombers equipped to carry nuclear-armed cruise missiles and nuclear-armed gravity bombs. The number of nuclear warheads carried on these delivery vehicles peaked in the late 1980s, at around 14,000 warheads. It has been declining ever since, both as the United States complies with limits in U.S.-Russian arms control agreements and as it has changed requirements after the Cold War. At the present time, the United States is reducing its forces to comply with the New START Treaty, which entered into force in early 2011. **Table 1** displays the force structure that the United States plans to retain when that treaty’s limits become binding in February 2018.

Table 1. U.S. Strategic Nuclear Forces Under New START

System	Total Launchers	Deployed Launchers	Warheads (est.) ^a
Minuteman III ICBM	454	400	400
Trident (D-5) SLBM	280	240	1,090
B-52 bombers	46	42	42
B-2 bombers	20	18	18
Total	800	700	1,550

Source: U.S. Department of Defense, Report on Plan to Implement the Nuclear Force Reductions, Limitations, and Verification, Washington, DC, April 8, 2014.

a. The treaty attributes only one warhead to each deployed bomber, although they could carry up to 20 bombs or cruise missiles.

Rationale for the Triad

Early in the Cold War, the United States developed these three types of nuclear delivery vehicles, in large part because each of the military services wanted to play a role in the U.S. nuclear arsenal. However, during the 1960s and 1970s, analysts developed a more reasoned rationale for the nuclear “triad.” They argued that these different basing modes had complementary strengths and weaknesses that would enhance deterrence and discourage a Soviet first strike. For example, ICBMs were believed to have the accuracy and prompt responsiveness needed to attack hardened targets such as Soviet command posts and ICBM silos, SLBMs had the survivability needed to complicate Soviet efforts to launch a disarming first strike and to retaliate if such an attack were attempted, and heavy

bombers could be dispersed quickly and launched to enhance their survivability, and they could be recalled to their bases if a crisis did not escalate into conflict.

The United States has reaffirmed the value of the nuclear triad. The Obama Administration noted, in the 2010 Nuclear Posture Review (NPR), that the unique characteristics of each leg of the triad were important to the goal of maintaining strategic stability at reduced numbers of warheads. It pointed out that strategic nuclear submarines (SSBNs) are the most survivable leg of the triad, that single-warhead ICBMs contribute to stability and are not vulnerable to air defenses, and that bombers can be deployed as a signal in crisis, to strengthen deterrence and provide assurances to allies and partners. It also noted that “retaining sufficient force structure in each leg to allow the ability to hedge effectively by shifting weight from one Triad leg to another if necessary due to unexpected technological problems or operational vulnerabilities.”

The Trump Administration, in the 2018 Nuclear Posture Review, also reaffirmed the U.S. commitment to the nuclear triad and to the modernization programs for each of the components of that force structure. It noted that “the triad’s synergy and overlapping attributes help ensure the enduring survivability of our deterrence capabilities against attack and our capacity to hold a range of adversary targets at risk throughout a crisis or conflict. Eliminating any leg of the triad would greatly ease adversary attack planning and allow an adversary to concentrate resources and attention on defeating the remaining two legs.”

Current Forces and Modernization Plans

The United States is currently recapitalizing each leg of its nuclear triad and refurbishing many of the warheads carried by those systems.

ICBMs

Until recently, the United States deployed 450 Minuteman III ICBMs at three Air Force bases: F.E. Warren AFB in Wyoming, Malmstrom AFB in Montana, and Minot AFB in North Dakota. Under the New START Treaty, the number has declined to 400 deployed missiles, although the Air Force will retain all 450 silo launchers. While each Minuteman III missile originally carried three warheads, each now carries a single warhead, both to reduce U.S. forces to New START levels and to adopt what is considered a more stabilizing posture.

Over the past 15 years, the Air Force pursued several programs designed to improve the accuracy and reliability of the Minuteman fleet and to, according to the Air Force, “support the operational capability of the Minuteman ICBM through 2030.” In addition, the Air Force is pursuing the Ground-based Strategic Deterrent (GBSD) which will retain

silo-based ICBMs but replace the entire flight system and all the ground launch control facilities. The Air Force plans to acquire 642 missiles to support testing and the deployment of a force of 400 missiles. The Air Force has estimated that this program will cost \$62.3 billion over 30 years, although the Pentagon's Cost Assessment and Program Evaluation Office has estimated that the cost could reach \$85 billion over 30 years. The Air Force expects the program to reach its initial operational capacity, with 9 missiles on alert, by 2029; it expects to complete the deployment, with 400 missiles on alert, in 2036.

SLBMs

The United States currently has 14 Trident (Ohio-class) ballistic missile submarines, with two in overhaul and 12 in the operational fleet. Under the New START Treaty, each of the submarines carries only 20, rather than the original 24, missiles. Using treaty counting rules, the 14 submarines count as a total of 280 deployed and nondeployed launchers, with 240 deployed launchers and around 1,000 warheads counting on the 12 operational submarines. The Navy operates two bases for these submarines—one in Bangor, WA, and one in Kings Bay, GA.

The Ohio-class submarines are scheduled to begin retiring from the fleet in 2027; the Navy is designing a new Columbia-class submarine that it expects to begin entering the fleet in 2031. The Navy initially estimated that each new submarine could cost \$6 billion to \$7 billion in FY2010 dollars, but it has worked to redesign the submarine and reduce the costs, with the plan to hold each submarine to around \$4.9 billion, in FY2010 dollars. The Navy has recently indicated that, using then-year dollars rather than 2010 dollars, the fleet of 12 new submarines will cost \$139 billion. Deployment will begin in 2031.

The Navy purchased over 530 D-5 missiles to support the Trident fleet. It is now pursuing a life-extension program for the missiles, so that they will remain capable and reliable throughout the life of the Ohio-class submarines and into the deployment of a new, Columbia-class submarine. The Navy currently spends approximately \$1 billion per year on this life extension program.

The National Nuclear Security Administration (NNSA), a semi-autonomous agency in the Department of Energy, is also working to extend the life of the warheads carried by U.S. SLBMs. NNSA plans to complete a life extension program (LEP) for the W76 warhead, which is carried by most Trident missiles, by 2019. This LEP is intended to add 30 years to the warhead life “by refurbishing the nuclear explosive package, the arming, firing, and fusing system, the gas transfer system, and many other associated components.” It will also include a small number of low-yield warheads, known as the W76-2, as mandated by the 2018 NPR. NNSA is also altering the W88 warhead, which is carried by a portion of the fleet, to address concerns with its safety and reliability. In particular, the program will replace the aging arming, fusing, and firing components.

Heavy Bombers

The Air Force has 20 B-2 bombers, based at Whiteman AFB in Missouri. The B-2 bomber can carry both B61 and

B83 nuclear bombs, but it is not equipped to carry cruise missiles. It can also carry conventional weapons and has participated in U.S. military campaigns from Bosnia to Iraq. The Air Force maintains 76 B-52H bombers at two bases, Barksdale, LA, and Minot, ND. The B-52 bomber, which first entered service in 1961, is equipped to carry nuclear or conventional air-launched cruise missiles (ALCMs). The B-52 bombers can also deliver a wide range of conventional arms, and are currently receiving numerous upgrades to their communications and electronics systems. The Air Force is also acquiring a new B-21 bomber, for both conventional and nuclear missions. It hopes to field between 80 and 100 of the new bombers, with the first to enter service around 2025. Costs remain classified.

According to unclassified estimates, the United States has around 475 B61 and B83 bombs. Several variants of the B61 bomb are undergoing a life extension program (LEP), to enhance the bomb's safety, security, and use control features. The Air Force is also designing a new tail kit for the B61 bomb, replacing the parachute currently used to slow the bomb's descent, to improve its accuracy. NNSA estimates that the B61 LEP will cost nearly \$9 billion, with an additional \$1-\$2 billion in Air Force funding for the new tailkit. The new model is expected to begin to enter the force in 2020. NNSA had planned to retire the B83, the largest bomb remaining in the U.S. arsenal, around 2025, after the completion of the B61 LEP, but, according to the 2018 NPR, may retain it for a longer time.

The Air Force is planning to replace the aging air-launched cruise missiles carried by B-52 bombers with a new advanced long range standoff (LRSO) cruise missile. According to the Air Force, the existing ALCM has been through several life extension programs and is beginning to show reliability problems. Reports indicate that the Air Force plans to buy a total of 1,000-1,100 LRSO missiles, at a cost of around \$10.8 billion, to support the testing program and deployment plans over the life of the missile. NNSA is also conducting a life-extension program on the W80 warhead to provide a warhead for the new LRSO.

CRS Products

CRS Report R41219, *The New START Treaty: Central Limits and Key Provisions*, by Amy F. Woolf

CRS Report RL33640, *U.S. Strategic Nuclear Forces: Background, Developments, and Issues*, by Amy F. Woolf

Other Resources

DOD. Nuclear Posture Review Report. April 2010.

State Department. New START Treaty. April 2010

Amy F. Woolf, awoolf@crs.loc.gov, 7-2379

IF10519