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Defense Primer: LGM-35A Sentinel Intercontinental Ballistic Missile

The LGM-35A Sentinel is an intercontinental ballistic missile (ICBM) system that is expected to replace the Minuteman III (MMIII) ICBM in the U.S. nuclear force structure. MMIII has served as the ground-based leg of the U.S. nuclear triad—land-based ICBMs, submarine-launched ballistic missiles, and nuclear-capable bombers—since 1970. The Department of Defense (DOD), which is "using a secondary Department of War designation," under Executive Order 14347 dated September 5, 2025, requested $4.1 billion for Sentinel research, development, test, and evaluation (RDT&E) in FY2026. This request assumed $1.5 billion from FY2025 reconciliation legislation (P.L. 119-21), commonly referred to as the One Big Beautiful Bill Act. The FY2025 reconciliation legislation included $2.5 billion for Sentinel "risk reduction activities." The FY2026 budget request for the Department of Energy's National Nuclear Security Administration (NNSA) included $649 million for the W87-1 nuclear warhead for the Sentinel. The FY2026 National Defense Authorization Act (NDAA P.L. 119-60) authorized $3.8 billion for Sentinel RDT&E and $649 million for the W87-1 warhead.

What Is an ICBM?

A U.S. ICBM can reach targets around the globe in approximately 30 minutes after launch. During the first three minutes, three solid fuel rocket motors power the missile's flight. After the powered portion of flight, the missile follows a parabolic trajectory toward its target. The missile releases its warhead during the mid-course portion of its flight, and the warhead continues to the target. Once the President authorizes the launch of any U.S. ICBM, the missile cannot be recalled or destroyed in flight. The same is true for nuclear missiles launched from U.S. submarines. In contrast, U.S. bombers can return to their bases, without releasing their weapons, although their weapons also cannot be recalled after their release.

The United States began deploying nuclear-armed ICBMs in 1959 and has maintained these systems "on alert," or able to launch promptly, since that time. The Air Force has tested MMIII missiles to a range greater than 6,000 miles, or 5,000 nautical miles. The United States bases its ICBMs solely in hardened concrete silos, known as launch facilities, located in North Dakota, Montana, Wyoming, Colorado, and Nebraska. Russia and China use both silos and road-mobile launchers for their ICBMs.

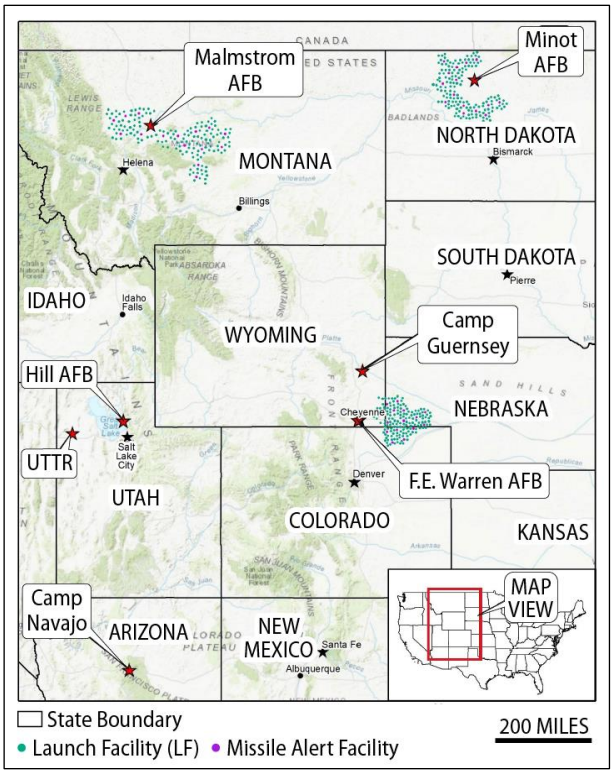
The Transition from Minuteman III

The U.S. Air Force first deployed Minuteman ICBMs in the 1960s. MMIII, which is currently deployed in a single-warhead configuration, but could carry up to three warheads, entered the force in 1970. The Air Force has replaced and updated many of the component systems on the missile—a process known as life-extension—several times over the past 50 years. The Air Force has stated that some of these components may face reliability concerns as they reach the end of their intended lifespans. After conducting an Analysis of Alternatives in 2014, the Air Force decided to replace MMIII with a new missile system (originally Ground Based Strategic Deterrent) that would serve through 2075. The Air Force argued that, when compared with a life-extended MMIII, the new ICBM would meet current and expected threats, maintain the industrial base, produce a modular weapon system, and reduce life cycle cost. The Air Force and Northrop Grumman, the Sentinel's lead defense contractor, planned for the Sentinel to begin replacing MMIII in 2029.

Program Status

The Air Force plans to procure 634 Sentinel missiles, plus an additional 25 missiles to support development and testing, to enable the deployment of 400 missiles. The Air Force also originally planned to modernize 450 silos and over 600 facilities (see **Figure 1**).

Figure 1. Sentinel Deployment and Support Locations



Source: Air Force Global Strike Command, 2023.

In January 2024, the Air Force informed Congress that the Sentinel program exceeded its initial cost projections, positing at least a 37% increase (from $118 million initial baseline cost to $162 million in 2020 dollars) in the cost per unit. This cost increase is known as a "critical" breach per the Nunn-McCurdy Act (Title 10 *U.S. Code* §§4371-4377), which requires DOD to certify that the program is essential to national security, has no cheaper alternatives, and cannot be terminated. It also mandates that DOD develop and validate new cost estimates and program milestones and submit this information to Congress. Air Force officials have attributed cost increases to supporting infrastructure updates.

On July 8, 2024, DOD announced that it had completed the Nunn-McCurdy review and that the program "met the statutory criteria to continue." DOD officials said the review resulted in the rescindment of the Sentinel's Milestone B approval and pointed to a further increase in costs and schedule delays. The Air Force is re-examining requirements and restructuring the program to make the ground segment "simpler" and "more affordable," according to Air Force officials, who also said in 2024 that a new acquisition strategy would be available around 2026.

DOD has been reviewing the program's potential schedule changes. The Sentinel's stage-one and stage-two rocket motors have been undergoing testing, but the missile's first developmental flight test has reportedly been delayed. November 2025 reports suggest that first test of the missile will be conducted from a launch pad. Air Force officials also stated in 2025 that the Sentinel may require new silos that reportedly could be built on Air Force-owned property.

Warheads

The Air Force plans to initially deploy the Sentinel with the W87-0 warhead currently on the MMIII. NNSA is developing the W87-1 warhead, which, according to NNSA, "is slated to deploy between FY2031 and FY2032." NNSA is also establishing capacity to produce 80 plutonium pits by 2030; NNSA announced the qualification of the first war reserve pit for the W87-1 in October 2024. Lockheed Martin is developing the Mk21A reentry vehicle for the W87-1; this reentry vehicle was tested in June 2024. DOD and NNSA are also modernizing the arming and fuzing assembly for the MMIII and the Sentinel. NNSA has said that it will conduct joint testing of the W87-1 "with Air Force and Mk21A programs" in FY2026.

Considerations for Congress

ICBM Force Necessity

Some analysts have argued that the United States reduce or eliminate its ICBMs because they increase the risk of accidental war, or because the invulnerability of ballistic missile submarines makes ICBMs "redundant." Advocates of retaining ICBMs have argued that these missiles are the most "responsive" leg of the U.S. nuclear triad. The 2022 Nuclear Posture Review (NPR), a Biden Administration review of U.S. nuclear policy, echoed past NPRs in stating that the three triad legs are "complementary," with each one "offering unique attributes."

MMIII Life-Extension

Some Members of Congress have questioned the need to fund and deploy new ICBMs; others have also suggested that the Air Force again consider MMIII life extension. They, along with other commentators, have argued that a delay or cancellation of Sentinel could ease financial and other pressures caused by the simultaneous recapitalization of all legs of the nuclear triad. In 2021, DOD commissioned an independent study on future ICBM options, which recommended an assessment of MMIII life-extension. However, the 2022 NPR endorsed Sentinel and said that any alternative "would increase risk and cost." Air Force officials stated in January 2024 that they did not see a "viable" long-term MMIII life-extension, though they were "committed" to doing "everything [they] can to keep it in the field." A September 2025 GAO study stated that the Air Force may operate the MMIII through 2050, though it faces parts obsolescence and other sustainment risks.

Sentinel Costs and Schedule

Some Members of Congress have been concerned about the costs and schedule delays associated with the Sentinel, the W87-1 warhead, and NNSA plutonium pit production. Section 1629 of the FY2025 NDAA (P.L. 118-159) imposed conditional requirements on the program to ensure oversight and opportunities for competition.

Risk of Sentinel Delays

Some Members of Congress have expressed concern about the risks associated with transition from the MMIII to the Sentinel. Since the FY2017 NDAA (§1667 of P.L. 114-328), Congress has required that the Air Force deploy no fewer than 400 on-alert ICBMs. Section 1632 of the FY2026 NDAA amended the *U.S. Code* to reaffirm this minimum requirement and also required that these ICBMs be deployed equally across "not fewer than 450" silos at F.E. Warren, Malmstrom, and Minot Air Force bases (Title 10 *U.S. Code* §9062).

An Air Force official reportedly stated in January 2025 that MMIII and Sentinel operations would overlap for at least 15 years. A September 2025 GAO report assessed MMIII to Sentinel transition risks and recommended that the Air Force develop a transition risk management plan. Section 1641 of the FY2026 NDAA mandates an Air Force strategy to sustain the MMIII and maximize its end-of-life margin.

In Section 1650 of the FY2024 NDAA (P.L. 118-31), Congress directed the Air Force to "develop a plan to decrease the amount of time required to upload additional warheads to the [ICBM] force." Section 1633 of the FY2025 NDAA limited the availability of certain DOD funds pending the submission of this plan to Congress. The 2023 report of the Congressional Commission on the Strategic Posture of the United States proposed considering such upload, within arms control limits, to field "the same number of warheads" "if the number of available [ICBMs] is reduced." The Commission report also proposed that the Air Force consider deploying Sentinel with multiple warheads or with "some portion of the future ICBM force" in a road-mobile configuration to account for evolving nuclear threats to the United States from Russia and China.

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