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U.S. Nuclear Weapons Tests

The United States has observed a voluntary moratorium on nuclear explosive testing since 1992, although it has maintained the ability to resume these tests at the Nevada National Security Site (NNSS). Since 1993, it has used a program known as Science-Based Stockpile Stewardship to maintain confidence in the "safety, security, and effectiveness" of its nuclear arsenal. Press reports in May 2020 indicated that Trump Administration officials had discussed whether to conduct an explosive test of a U.S. nuclear weapon. Since then, the first Trump Administration and subsequent Biden Administration statements have reaffirmed the moratorium.

In an August 2024 video, the Department of Energy (DOE) National Nuclear Security (NNSA) Administrator stated that the United States has "no technical reasons" to conduct nuclear tests. Some analysts have expressed concerns that NNSA development of new warhead designs could "result in demands to resume explosive testing." Congress may continue to face these issues as it considers authorizing and appropriating funds for the stockpile stewardship program, as well as modernization of the nuclear security enterprise.

Limits on U.S. Nuclear Tests

By its own count, the United States conducted 1,054 explosive nuclear tests between 1945 and 1992. Of these, NNSS hosted 928 tests, including 100 atmospheric tests. In 1990, Congress created a program to compensate some individuals whose health may have been affected by this testing. DOE also engages in environmental remediation at NNSS.

The United States has been a party since 1963 to the Limited Test Ban Treaty, under which it is obligated to refrain from conducting nuclear weapons test explosions in the atmosphere, outer space, or under water. The United States is also party to the Threshold Test Ban Treaty of 1974, which bans underground nuclear weapons tests having an explosive force of more than 150 kilotons.

In 1992, Congress passed and President George H.W. Bush signed into law the Hatfield-Exon-Mitchell Amendment establishing a temporary unilateral moratorium on underground nuclear testing (P.L. 102-377, §507; 50 U.S.C. §2530). It states that "no underground test of nuclear weapons may be conducted by the United States after September 30, 1996, unless a foreign state conducts a nuclear test after this date, at which time the prohibition on United States nuclear testing is lifted." Several foreign states have conducted nuclear tests since 1996.

The United States then participated in negotiations on the Comprehensive Test Ban Treaty (CTBT). This multilateral treaty, which opened for signature in 1996, would ban all nuclear explosions. President Clinton signed and submitted the treaty to the Senate for advice and consent to ratification in 1997. Amid expressions of concern among some Members of Congress about CTBT's potential national security implications, the Senate rejected the treaty on October 13, 1999, by a vote of 48 for, 51 against, and 1 present.

As of August 2025, 187 states parties had signed the CTBT and 178 had ratified it. The treaty's entry into force requires ratification by 44 specific states listed in the CTBT. Of the 44 required states, 35 have ratified, 3 have not signed (India, North Korea, and Pakistan), and another 5 have not ratified (China, Egypt, Iran, Israel, and the United States). Russia revoked its ratification of the treaty in November 2023. In the years since the treaty opened for signature, India, Pakistan, and North Korea have conducted explosive nuclear tests.

Although the CTBT has not entered into force, each subsequent U.S. President has indicated that the United States will continue to observe the unilateral moratorium. Most recently, this moratorium was articulated in the Trump Administration's 2018 Nuclear Posture Review (NPR) and the Biden Administration's 2022 NPR.

The CTBT contains a "zero-yield" standard, which requires states to refrain from conducting "any test that produces a self-sustaining, supercritical chain reaction of any kind," according to a 2019 U.S. State Department report. Such a reaction is necessary for a nuclear detonation. Neither the CTBT nor the U.S. unilateral test moratorium prohibits subcritical experiments (i.e., those that do not produce a nuclear yield).

Foreign Countries

The United Kingdom and France also adhere to a zero-yield nuclear testing standard in line with their CTBT commitments. U.S. government official statements and reports to Congress have questioned the Russian Federation's and the People's Republic of China (PRC's) adherence to their respective testing moratoria and the zero-yield standard. The unclassified 2024 version of the State Department's annual arms control Compliance Report to Congress notes concerns "due to the lack of transparency with regard to their respective nuclear testing activities and previously identified adherence issues." Since 2019 this report has stated that Russia had previously conducted nuclear weapons-related experiments with more than zero yield. Department of Defense statements and reports outline PRC efforts to expand "its nuclear warhead research, development, testing, and production capacity to support the size and pace of its nuclear stockpile expansion," as well as "the PRC's possible preparation to operate its Lop Nur nuclear test site year-round."

Science-Based Stockpile Stewardship

In 1993, President Bill Clinton signed two Presidential Decision Directives (PDDs) that affected the U.S. nuclear testing program. PDD-11, the text of which has not been publicly released, reportedly continued the voluntary moratorium and directed DOE to formulate a program to protect the U.S. capability to resume nuclear testing. PDD-15 set the policy for the stockpile stewardship plan, which would allow it to maintain and sustain the nuclear stockpile under the moratorium or an eventual CTBT.

NNSA conducts subcritical experiments at NNSS and uses computational and other tools to maintain stockpile reliability without nuclear testing. Pursuant to Title 50, Section 2523, of the *U.S. Code*, it produces an annual plan—known as the Stockpile Stewardship and Management Plan (SSMP)—that outlines the goals, programs, and projects intended to provide a high level of confidence in the stockpile. NNSA also maintains "readiness to conduct an underground nuclear explosive test, if required, to assess safety and performance characteristics of the Nation's stockpile, or if otherwise directed by the President." In the National Defense Authorization Act for FY2003 (P.L. 107-314, §3141), Congress mandated that the directors of the three NNSA national laboratories and the Commander of U.S. Strategic Command (STRATCOM) provide, through the Secretaries of Energy and Defense, annual assessments of the "safety, reliability, performance, or military effectiveness" of weapons in the stockpile to the President and Congress.

U.S. Test Readiness

The President retains the authority to authorize an explosive test under certain conditions. The 2020 Nuclear Matters Handbook, produced by the Department of Defense, states that "if an urgent issue with a weapon were to arise that required a nuclear test, the Secretaries of Defense and Energy, the President, and Congress would be notified outside of the context of the annual assessment process."

The United States maintains the capability to resume testing within 24-36 months of a presidential decision to do so. President Clinton established this timeline when he signed PDD-15 in 1993, and it remains the goal today. According to the FY2024 SSMP,

> National Security Memorandum-7 [issued by the Biden Administration in 2022] establishes as U.S. policy an expectation that the United States must be ready to perform an underground nuclear explosive test using a [weapon] drawn from the existing stockpile and limited diagnostics within 36 months, assuming current barriers to achieving this timeline in relevant laws and regulations will be overcome. Nuclear test timeline and cost would depend on the specific details of the test.

According to the FY2024 SSMP, NNSA maintains test readiness "by exercising capabilities and workforce" at the three U.S. national security laboratories and the NNSS "through the Stockpile Stewardship Program and other NNSA programs." Key among these capabilities are subcritical testing and other experiments. The United States has conducted 34 subcritical experiments consistent with the U.S. zero-yield standard since the 1992 moratorium. NNSA officials stated in 2023 that NNSA will increase the number of subcritical experiments to "three subcritical experiments per year by the end of the decade."

According to a 2012 National Academies of Sciences study, the response time for resuming underground explosive testing is driven more by compliance with environmental, health, and safety regulations than by the technical testing requirements or the need to restore equipment and facilities. NNSA has also indicated that "assuring full compliance with domestic regulations, agreements, and laws relating to worker and public safety and the environment, and international treaties" would extend the response time. At the same time, according to the SSMP, the President can declare a national emergency and waive all "applicable statutory and regulatory restrictions."

NNSA has not allocated funding to maintain nuclear test readiness as a separate program since FY2010. Instead, it funds the activities that support test readiness through other program areas in the NNSA Weapons Activities account, such as the Stockpile Research, Technology, and Engineering (SRT&E) program. In its FY2026 budget submission, NNSA requested $4.2 billion for SRT&E, an increase of $1.1 billion from the FY2025 request.

Potential Implications

A potential restart of U.S. nuclear testing, and its implications, are a matter of periodic debate. According to May 2020 press accounts, some who advocated for a U.S. nuclear test asserted that the test "could prove useful from a negotiating standpoint as Washington seeks a trilateral deal to regulate the arsenals of the biggest nuclear powers." At the time, some congressional and nongovernmental nuclear testing opponents argued that resumed testing could induce other nuclear states to restart testing programs. This, in turn, could generate nuclear or missile arms races, or new nuclear weapons programs in states without such weapons.

More recently, in a 2024 article, a former Trump Administration official argued that the United States should "test new nuclear weapons" to "maintain technical and numerical superiority to the combined Chinese and Russian nuclear stockpiles." Another former Trump Administration official argued that NNSA should "move to immediate test readiness to give the Administration maximum flexibility in responding to adversary actions."

One nonproliferation analyst countered that a U.S. restart of testing would enable Russia and China, which are currently disadvantaged because the United States has conducted a significantly greater number of nuclear tests and possesses much better computational tools, to restart testing and catch up with the United States. Former Secretary of Energy Ernest Moniz has argued that the case for nuclear explosive testing was "not justified by science or military necessity," could trigger an arms race, and would "endanger the physical and economic health of Nevadans."

Anya L. Fink, Analyst in U.S. Defense Policy
Mary Beth D. Nikitin, Specialist in Nonproliferation

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