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U.S. Nuclear Weapons Tests

Press reports in May 2020 indicated that officials in the Trump Administration had discussed whether to conduct an explosive test of a U.S. nuclear weapon. 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 Nuclear 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.

Limits on U.S. Nuclear Tests

By its own count, the United States conducted 1,054 explosive nuclear tests between 1945 and 1992. In 1992, Congress passed and President George H.W. Bush signed into law the Hatfield-Exon-Mitchell Amendment establishing a temporary and unilateral moratorium on underground testing of U.S. nuclear weapons (P.L. 102-377, §507). 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.

After declaring its testing moratorium in 1992, the United States advocated for and participated in negotiations on the Comprehensive Test Ban Treaty (CTBT). This treaty, which opened for signature in 1996, would ban all nuclear explosions. President Clinton submitted the treaty to the Senate for advice and consent to ratification in 1997. The Senate rejected the treaty on October 13, 1999, by a vote of 48 for, 51 against, and one present.

As of March 2020, 184 states had signed the CTBT and 168 had ratified it. For the treaty to enter into force, 44 specified states must ratify it. Of the 44 required states, 36 have ratified, three have not signed (India, North Korea, and Pakistan), and another five have not ratified (China, Egypt, Iran, Israel, and the United States). In the years since the treaty opened for signature, India, Pakistan, and North Korea have conducted explosive tests.

Although the treaty has not entered into force, each subsequent U.S. President has indicated that the United States will continue to observe its unilateral moratorium. The Trump Administration's 2018 Nuclear Posture Review says, "The United States will not resume nuclear explosive testing unless necessary to ensure the safety and effectiveness of the U.S. nuclear arsenal, and calls on all states possessing nuclear weapons to declare or maintain a moratorium on nuclear testing." In June 2020, Ambassador Marshall Billingslea, Special Presidential Envoy for Arms

Control, said "I am unaware of any particular reason to test at this stage."

The "zero-yield" standard conveyed by the Comprehensive Test Ban Treaty requires states to refrain from conducting "any test that produces a self-sustaining, supercritical chain reaction of any kind." Such a reaction is necessary for a nuclear detonation. However, neither the CTBT nor the U.S. unilateral test moratorium prohibits subcritical experiments (i.e., those that do not produce a nuclear yield). The United States conducts these types of experiments at its Nevada National Security Site.

The U.S. State Department has raised questions about Russia and China's compliance with the CTBT's zero-yield standard. In its annual arms control Compliance Report, the State Department assessed that Russia has conducted nuclear weapons-related experiments with more than zero yield in the past, although it could not confirm that they had done so in 2019. It also noted that China is pursuing activities at its nuclear weapons test site that might allow it to conduct such experiments in the future. Some analysts and experts following developments in China questioned this assertion, noting that the alleged activities at China's testing facility do not violate the CTBT. Moreover, they note that, if the United States and China ratified the CTBT and the treaty entered into force, the United States could then call for on-site inspections of test sites if suspected violations occurred. Other U.S. analysts view Russian and Chinese efforts as a reason for the United States to withdraw its signature from the CTBT and possibly resume explosive tests.

Science-Based Stockpile Stewardship

In 1993, President Clinton signed two Presidential Decision Directives (PDDs) that affected the U.S. nuclear testing program. PDD-11 continued the voluntary moratorium and directed the Department of Energy to formulate a specific safeguard program to protect the U.S. capability to resume U.S. nuclear testing if needed. PDD-15 set the policy for the U.S. stockpile stewardship plan, which would allow it to maintain and sustain the nuclear stockpile under the moratorium or an eventual CTBT. The National Nuclear Security Administration (NNSA) produces an annual plan—known as the Stockpile Stewardship and Management Plan (SSMP)—that outlines the goals, programs, and projects intended to provide this high level of confidence in the stockpile (50 U.S.C. §2523). NNSA conducts subcritical experiments and uses other tools to maintain stockpile reliability without nuclear explosive testing. It also "maintains the readiness to conduct an underground nuclear test, if required, to ensure the safety and effectiveness of the Nation's stockpile or if otherwise directed by the President."

In the National Defense Authorization Act for 2003 (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 an annual assessment of the safety, security, and reliability of the U.S. nuclear stockpile. They report to the Nuclear Weapons Council, which then reports to the President. In each year since this law passed, the Nuclear Weapons Council has reported that the United States can maintain confidence in the stockpile without resuming explosive nuclear testing. Nevertheless, the President could still authorize an explosive test under certain conditions. The Nuclear Matters Handbook, produced by the Department of Defense, says 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.”

U.S. Test Readiness

Although the United States has observed a moratorium on nuclear testing since 1992, it has maintained the capability to resume testing within 24-36 months of a decision to do so. President Clinton established this timeline when he signed PDD-15 in 1993, and it remains the goal today. According to a 2011 report to Congress from the Department of Energy, “a fully instrumented test to address a complex stockpile problem would take 24 to 36 months, and tests required for development of a new capability might take up to 60 months.” However, “a very simple test for political purposes could be conducted in as little as 6-10 months.” Drew Walter, speaking as the Deputy Assistant Secretary of Defense for Nuclear Matters, recently confirmed this assessment when he noted that the United States could conduct “a very quick test with limited diagnostics ... within months.”

According to the 2011 report, NNSA maintains test readiness “by exercising capabilities and workforce at the national security laboratories and the Nevada National Security Site through the Stockpile Stewardship Program.” Key among these capabilities are subcritical experiments, along with “other high explosive driven experiments and high energy density experiments” that allow personnel to maintain the skills needed for nuclear testing. NNSA also maintains the sites, facilities, and equipment that it would use if the United States resumed explosive tests.

According to a 2012 National Academies of Sciences study, the response time for resuming underground explosive testing would be driven more by the need to meet regulatory requirements than by the technical needs of the test 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 significantly extend the time required for execution of a nuclear test.” At the same time, according to the SSMP, the President can declare a national emergency and waive all “applicable statutory and regulatory restrictions” if he wants to conduct a test in months, rather than years.

NNSA has not allocated specific 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. The Senate, in its version of the FY2021 National Defense Authorization Act (S. 4049, §3167), would make \$10 million available to NNSA for projects that could reduce the time needed to execute a nuclear test.

NNSA has not offered an estimate of the cost of conducting a nuclear test; that cost would depend on the specific details of the test. A test designed to demonstrate only a weapon explosion would likely cost less than a fully instrumented test designed to evaluate the safety and reliability of a weapon that had been modified to address technical concerns, or a test designed to demonstrate the capability and effects of a new type of weapon. Moreover, before conducting a fully instrumented test, NNSA would likely have to invest in the equipment and facilities needed to conduct the test, and possibly hire additional personnel with the necessary knowledge and skills. It may also have to meet additional environmental review requirements mandated by U.S. laws before resuming testing.

Potential International Implications

According to May 2020 press accounts, some who argued for the United States to conduct a 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.” According to one account, “the apparent motive behind the proposal ... was somehow to add pressure on China” to join the talks.

Others counter that the United States would undermine its arms control and nonproliferation objectives if it were to conduct a nuclear test. Some Members of Congress and nongovernmental arms control advocates have spoken out against the resumption of testing, saying it could harm the United States’ decades-long policy of preventing nuclear proliferation, potentially leading other nuclear states to restart testing programs. This, in turn, could evolve into nuclear or missile arms races, or new nuclear weapons states. A group of well-known physicists with experience in nuclear weapons issues explained their strong opposition to a resumption of nuclear testing in a June 2020 letter to Senate Majority Leader Mitch McConnell, in which they argued that there is no technical or military need for such a test, and that it would have negative security consequences for the United States. They argued, “A likely response to a US test would be a resumption of testing by Russia and China, and perhaps also by North Korea, India, and Pakistan. This would further undermine the Nuclear Non-Proliferation Treaty (NPT).”

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