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# The Chapter on US Nuclear Testing Must be Closed

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## TOPLINE

The United States faces escalating global nuclear threats, with multiple nuclear-armed states modernizing arsenals, testing cutting-edged delivery systems, including ballistic and hypersonic missiles, and signaling readiness to cross historic red lines relative to the use of nuclear weapons. Amidst this volatility, proposals for the incoming Trump administration to resume US underground nuclear testing risk undermining decades of international restraint that rendered such tests a global anathema. Resuming nuclear testing by the United States is unnecessary and destabilizing. A return to nuclear testing will weaken established international norms, to include a test ban, and set an uncertain course that brings the world closer to the catastrophic use of these weapons. Proliferators will take their cues from any decision by the United States. Further testing would only incrementally provide new information not already available from comprehensive laboratory studies and simulations. The current moratorium on nuclear testing by the United States is a critical pillar of global nuclear restraint.

## THE PROBLEM

The prospect of resuming underground nuclear testing has reemerged as the new administration takes office. Since the last US underground nuclear test in 1992, nuclear testing capabilities and infrastructure have significantly declined, raising concerns about the longer timeframe required to conduct another test. However, in the place of testing, the United States has relied on advanced science-based stockpile stewardship

sponsored by the US Department of Energy and its National Nuclear Security Administration to assess the reliability and effectiveness of its nuclear arsenal. During the first Trump administration, the idea of restarting nuclear testing was considered as part of readiness efforts aimed at reducing the time needed to conduct a test if required. Some advisors to the incoming Trump administration have now renewed calls for resuming nuclear testing, arguing that detonating a nuclear weapon is necessary to reinforce its role as a deterrent. Nuclear weapons are indeed inherently complex, with precise interactions between nuclear fuels, high explosives, and other components occurring within nanoseconds. The decision to restart testing weighs the potential benefits of demonstrating stockpile reliability using live tests against the risks of undermining nonproliferation and arms control efforts.

## **ESSENTIAL CONTEXT**

### **Background of Nuclear Testing by the United States**

From 1945 to 1992, the United States conducted 1054 nuclear tests on and off the continental United States. 828 of these tests were conducted underground at the Nevada National Security Site (NNSS; formerly the Nevada Test Site). Nuclear tests initially served to establish the viability of new nuclear weapons designs as well as evaluate the effects of a nuclear detonation on military and civilian infrastructure. Nuclear testing by the United States continued unabated for the next 47 years except for a brief moratorium from 1958 to 1961 during the Eisenhower and Kennedy administrations, where there was recognition of the role of testing as an accelerant to the nuclear arms race. In 1992, testing by the United States was suspended by the George H.W. Bush administration following the collapse of the former Soviet Union, and this ban was extended by the Clinton administration under the framework of the Comprehensive Nuclear Test Ban Treaty, which, while not fully ratified, has subsequently served as a de-facto norm against testing.

Since the voluntary nuclear test moratorium went into effect in 1992, the United States has depended on a comprehensive science-based stockpile stewardship to ensure the viability of its nuclear arsenal. Diverse and extensive technical efforts conducted in the laboratory, in the field and through computer simulation evaluate all aspects of nuclear weapons design and ensuing performance to ensure readiness to meet the Department of Defense's design specifications without testing.

Nuclear testing by the United States also had a substantive environmental impact. Approximately one-third of the underground nuclear tests detonated in Nevada from 1951 to 1992 were at or near the water table. Field studies there have demonstrated the mobility of radionuclides, including plutonium, in groundwater. The population of Las Vegas in 1992 was approximately 300,000; the population has now more than doubled

to 650,000, with more than 2.5 million living in the greater Las Vegas metropolitan area. Since nuclear testing ended in 1992, environmental management at the NNSS has been a priority at federal and state levels.

### **Emerging Threats with Implications for Nuclear Weapons Development and Testing**

Today's geopolitical and nuclear landscape is far more complex and volatile than when testing ceased at the end of the Cold War. Profound transformation in nuclear proliferation is butting up against established norms. Emerging nuclear weapons programs will be influenced by any decision by the United States. Further testing would only incrementally provide new information not already available from over three decades of extensive laboratory studies and simulations used to annually assess the safety, security, and reliability of US nuclear weapons.

- **Nuclear proliferation.** The nuclear weapons states are expanding and modernizing their arsenals. China, Russia, North Korea, and Iran are exploring new doctrines that integrate nuclear use into their geopolitical goals, including great power status with influence in Eastern Europe, on the Korean Peninsula, and beyond. Alliances between these nations allow for the evasion of export control of sensitive nuclear technologies. Production of nuclear weapon fuels continues. Centrifuges in Iran are increasing production of highly enriched uranium at up to 60% percent uranium-235; North Korea has constructed a complex of centrifuge enrichment facilities for the likely enrichment of low to weapons grade uranium.
- **Technological advancements.** Rather than “bigger is better” megaton yield strategic weapons, there has been a move to field lower yield weapons of 100 kilotons or less mated to precision-guided delivery systems. This shift blurs the lines between use of conventional weapons and smaller nuclear weapons that may target a stalemated battlefield. Without a definitive threshold that differentiates strategic from tactical nuclear weapons, potential use of a nuclear weapon in a regional conflict becomes an option. With new delivery systems and smaller payloads, the time to respond to a launch is compressed, heightening the risk of a nuclear exchange.
- **Nuclear rhetoric and arms control.** Both North Korea and the Russian Federation have repeatedly “rattled the nuclear saber,” highlighting their nuclear weapons programs and signaling their potential use in response to what they perceive as a provocation. Arms control efforts are floundering. Over the past five years, Russia has withdrawn from the Intermediate-Range Nuclear Forces Treaty and rescinded its ratification of the Comprehensive Nuclear Test Ban

Treaty; the prospect for the United States and Russia to extend the New START Treaty beyond 2026 is uncertain. North Korea last conducted a nuclear test in 2017; its persistence in the pursuit of nuclear weapons and its test program are central to the very existence of the regime. Current arms control frameworks do not include smaller, tactical nuclear weapons recently emphasized in the context of the ongoing war in Ukraine.

## **POLICY RECOMMENDATIONS**

**Maintain the moratorium on nuclear testing.** The United States should reaffirm its moratorium on nuclear testing as a cornerstone of its national security strategy. Transparency in the testing moratorium is enabled through diplomatic and technical means including the international monitoring system of the Comprehensive Nuclear Test Ban Treaty Organization (CTBTO). Decades of science-based stockpile stewardship in the United States have enabled the weapons complex to assess the reliability of all weapons in the stockpile without the need for testing. A combination of studies of materials used in nuclear weapons at extreme conditions, subcritical experiments that study the effects of special nuclear materials in the presence of high explosives, high fidelity three-dimensional computer simulations of weapons performance using new data as well as data archived from the earlier atmospheric and underground tests provides necessary confidence in the effectiveness of the US nuclear deterrent. A return to nuclear testing risks triggering a global cascade of testing and undermines the diplomacy that built international nonproliferation norms.

**Strengthen nonproliferation norms.** As the first country to test nuclear weapons, the United States plays a pivotal role in shaping and upholding global norms. Resuming nuclear testing would scuttle collective efforts to stop testing and raise risk calculations, inspiring other states to follow suit. Renewed testing by the other countries will advance the performance of their own stockpiles, further undermining nonproliferation goals.

The 2018 Nuclear Posture Review completed during the first Trump administration prioritized an expanded nuclear weapons enterprise emphasizing lifetime extension programs. The review further recognized that Russia and China have prioritized nuclear weapons as existential to their national defense. The recommendation in 2018 did not advocate the return to nuclear testing. This suspension was also upheld in the Biden administration's 2022 Nuclear Posture Review. As part of the incoming administration's Nuclear Posture Review, the United States should extend prior pronouncements not to conduct nuclear tests and rely instead on the substantive reinvestments in the nuclear weapons complex and stockpile stewardship.

**Further diplomacy.** Maintaining secure and reliable communication with both allies and adversaries regarding nuclear testing is essential, utilizing both official and unofficial channels while rigorously protecting sensitive information about U.S. nuclear weapons design and performance. Peer-to-peer dialogue is indispensable at all levels. Internationally, the CTBTO was established to implement a verification regime and operates a global network of seismic, hydroacoustic, infrasound, and radionuclide detection stations. These stations have recorded signatures from nuclear tests that are distinctly unique from those caused by seismicity and volcanism. The international monitoring system requires continued support to distinguish signatures of civilian nuclear infrastructure from those of nuclear weapons tests. High confidence verification through technical means to ensure all nuclear experiments are zero yield must complement diplomatic engagement. Consideration should also be given to an informed response to an unattributed nuclear test involving either state or non-state actors to lessen ambiguity and determine responsibility.