

America's Ossified Nuclear Infrastructure Needs an Overhaul—Now

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KEY TAKEAWAYS

The U.S. is modernizing its nuclear arsenal—but, given the Russian and Chinese threats, production of plutonium pits for nuclear warheads is unacceptably delayed.

If America's adversaries question the credibility of its strategic deterrent, the global order—and America's role in it—could be further weakened.

The U.S. must make the production of plutonium pits a national security priority—now.

From the Russian invasion of Ukraine to Chinese aggression in the Western Pacific, the collapse of nuclear arms control, increasing rattling of Russia's nuclear saber, and the horrific massacre of more than 1,000 civilians in Israel, it is clear that the global security environment is becoming not only increasingly challenging, but fundamentally unstable.

At the same time, various groups in recent weeks have released reports on the United States' ability to deter aggression. A congressionally mandated, bipartisan Strategic Posture Commission released its final report, in which it articulated a grave and growing “deterrence gap.”¹ The Department of Defense's (DOD's) report on China's military power noted that China has doubled the size of its nuclear arsenal in the past two and a half years—and the pace of its nuclear

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expansion is accelerating.² The DOD “Strategy for Countering Weapons of Mass Destruction” stated that Iran could produce enough fissile material for a nuclear weapon in as little as “two weeks.”³

Given all these dangers, one might assume that the United States’ nuclear arsenal is more than capable of deterring such threats and providing the ultimate guarantor of America’s freedom and prosperity.

Such an assumption would be false.

Nuclear Modernization

Since 2010, the United States has been modernizing its nuclear enterprise. It is building a new nuclear-capable bomber, the B-21 Raider, to replace the aging B-2 Stealth bomber; the *Columbia*-class ballistic missile submarines, to replace the 40-year-old *Ohio*-class ballistic missile submarines; and the Sentinel intercontinental ballistic missile (ICBM), meant to replace the Minuteman III ICBMs first fielded in the 1970s. At the same time, various nuclear-capable cruise missiles are also being replaced, along with subordinate command-and-control architectures.

All this is good—but what about the nuclear warheads themselves?

Nuclear warheads are the explosive package that fit on top of the missiles or inside the bombs that produce nuclear yield. They require an explosives, sensor, and wiring package needed in modern weapons systems, but they also require radioactive, fissile material that produces the nuclear yield that sets nuclear weapons apart from most conventional explosives. That radioactive, fissile material—made from either plutonium or highly enriched uranium, combined with other exotic radioactive isotopes—must be precisely engineered and extremely “pure” in order to produce a nuclear yield.

Put simply, if the fissile material, whether it is the plutonium or enriched uranium that provides the radioactive core of a nuclear weapon, is not pure enough and machined to the precise requirements of the new warheads being produced, these nuclear weapons will not work according to the military requirements. If the nuclear weapons will not work, the tens of billions of dollars spent on new submarines, new bombers, and new missiles as part of the nuclear deterrent will have been wasted.

What is even more worrisome is that, if America’s adversaries question the credibility of its strategic deterrent, the global order—and America’s role in it—could be further weakened.

The Nature of the Problem

In the popular imagination, nuclear weapons are seen as cutting-edge technologies. Nothing could be further from the truth.

The “newest” nuclear warhead in the U.S. inventory, the W-88, rolled off the assembly line almost 35 years ago.⁴ Other warheads are far older: The B-61 gravity bomb, for example, began coming off the assembly line in 1963—60 years ago.

Most Americans do not drive cars that are 35 years old. Fewer drive cars that are 60 years old unless they admire antiques. And even fewer would expect a sixty-year-old car to turn on, if it still had the same wiring, transmission, and oil as was installed when John F. Kennedy was President.

But that is essentially what the United States is asking of the nuclear arsenal—and why the United States is embarking on a modernization program to produce new warheads: to ensure that should anyone “turn the key” on an existing warhead, that it will still work.

A reasonable question is why the United States cannot use existing plutonium from its stockpile of decommissioned nuclear weapons in the new warheads.

To begin with, while plutonium has a half-life measured in tens of thousands of years, even a relatively small change in the composition of the warhead’s plutonium material and associated exotic radioactive isotopes as they degrade over the decades can affect the yield, or explosive power, of nuclear weapons. More important, however, is that existing plutonium pits were designed for warheads designed decades ago. Newer, more reliable warhead designs that do not require nuclear testing may need plutonium pits that are configured differently. In those cases, using plutonium pits that are not optimized to new warheads could create explosive yields that are radically lower than expected—and therefore may not meet the military requirements of said weapons.

Further, as part of the nuclear modernization effort began in 2010, the United States must produce 80 pits a year by 2026 to do a one-to-one replacement for the current arsenal. That is, to accommodate the current warhead modernization, America’s national labs must produce 80 plutonium pits every year by 2026 to sustain the current arsenal. According to a 2023 Government Accountability Office (GAO) report, if the United States remains on its current trajectory, it will not produce 80 plutonium pits annually before 2030—possibly much later.⁵ Other participants have suggested that the U.S. might not be able to build that number of pits annually before 2040.⁶

If the United States decides to expand the current nuclear arsenal and create a larger, more diverse force, then it may need significantly more than 80 plutonium pits a year by 2030.

Origins of the Problem: Complacency and Underinvestment

The dire state of the nuclear arsenal leads one to wonder: How did the U.S. reach this point? Several factors contributed, and understanding them is the basis for the recommendations of this *Issue Brief*. The insights below draw on a recent workshop that The Heritage Foundation hosted, examining the challenges associated with plutonium pit production. The bipartisan group of attendees included former senior officials from the Department of Energy; the DOD; the National Nuclear Security Administration (NNSA), the federal agency responsible for building and maintaining America's nuclear arsenal; the National Security Council staff; and key congressional staffers.

A Culture of Complacency. The U.S.'s ongoing struggle to produce plutonium pits reflects the degree to which nuclear weapons fell on the national priority list after the Cold War. The stigma surrounding nuclear weapons, while understandable given their destructive nature, drove an aversion to defending nuclear weapons politically or to funding the infrastructure and workforce necessary to maintain the arsenal. Strategic vision and direction for national defense is set by the President and no U.S. President in the past 20 years made the case to Congress or the American people for investment in the nuclear arsenal.

This lack of prioritization at the highest levels shaped the way the Energy Department, the DOD, the NNSA, and the relevant national labs and production facilities all do business. Their lack of urgency has delayed pit production, and no comprehensive plan exists to get the process back on schedule, despite the GAO recommending the creation of such an integrated master schedule since 2020.⁷

Lack of a Skilled Workforce. The U.S. has not produced new plutonium pits—or nuclear weapons—in more than three decades. As a result, very few (if any) current engineers or skilled workers have performed the necessary functions associated with pit production in a generation. New pit production will require hiring and training an entirely new skilled workforce, and those new hires will greatly outnumber experienced employees, meaning that trainees and junior employees will have less oversight and mentorship on the job.

Lack of Industrial Infrastructure. Because the United States stopped making plutonium pits for decades, many associated manufacturing and

processing facilities at Los Alamos National Laboratory and Savannah River Site were either repurposed or shuttered. New facilities are under construction, but that construction has already seen significant delays. New production lines are being set up—but are experiencing delays. New equipment is being purchased and installed—but slowly. Time is not on America's side.

Environmental and Safety Regulations. Plutonium is highly toxic—regulating plutonium production to prevent contamination of surrounding areas or potential accidents is justified. However, environmental and safety regulations are extremely stringent and time-consuming. They have, and will, delay pit production. As one Heritage workshop participant noted, “there are procedures that, if they have a one in a hundred million chance of producing a nuclear yield, cannot be done. The problem is that the chance of nuclear war today is far greater than one in a hundred million. We must think about how we accept risk.”⁸

Five Recommendations for Increasing Plutonium Pit Production

The following five recommendations—the product of a bipartisan discussion of nuclear enterprise experts—address both the operational and cultural problems delaying pit production.

1. **The U.S. President should make warhead production a top national priority.** The President must make the case to the American people that nuclear weapons are the ultimate guarantor of their freedom and prosperity. While America's nuclear arsenal remains effective today, it is aging, and the country must reinvest in the arsenal in the face of Russian nuclear primacy and the breathtaking nuclear expansion underway today in China.
2. **Public policy experts and nuclear security professionals should educate the general public on the vital importance of pit production and nuclear modernization to U.S. national security.** The increasing public perception of the threat from China is an opportunity to make the importance of this topic clear to the American people. Those who understand the urgency of nuclear modernization can help to educate them—and their leaders—on the importance of a viable nuclear deterrent to maintaining America's way of life. More specifically, U.S. presidential candidates should be briefed on the risks posed

by delayed pit production. The goal of these briefings would be to ensure that (1) a viable nuclear arsenal is a top priority of next President, and (2) the President understands that expedited pit production today is the only way to ensure that viability in the next 10 years.

3. **The NNSA should transition to a wartime footing.** The President should ensure that the culture of the NNSA changes to reflect the dire state of the nuclear arsenal and the urgency of pit production and nuclear modernization:
 - a. **The President should select a Secretary of Energy and NNSA Director who have the necessary experience and shared sense of urgency needed to prioritize nuclear modernization.** The Secretary of Energy should have experience on the military, rather than civil, side of nuclear power—and should make warhead production a top priority.
 - b. **The Secretary of Energy and NNSA Director should leverage all available executive authorities to expedite pit production.** The President, and (by delegated authorities) the Secretary of Energy and NNSA Administrator, should have authority to waive environmental and safety regulations, include expedited timelines in facilities construction and other contracts, direct the use of expedited hiring authorities, use Defense Production Act funding to give loans and equipment to contractors, and even pay more for expedited performance of construction. All available authorities should be used to deliver pits faster.
4. **Congress should increase funding for pit production projects.** Hiring engineers and other professionals, expediting construction projects, and using the Defense Production Act all require additional appropriations from Congress. Given the dire urgency of producing plutonium pits, Congress should appropriate all necessary funds to expedite and ensure continuity of pit production, to include increasing the NNSA Administrator’s discretionary budget, so that needed funds to address specific, immediate, or emergent priorities can be readily available. There are numerous available offsets, including the use of research and development funds within the DOD not allocated to munitions or platform production.

5. The NNSA should hire project management experts to plan and execute pit production. Pit production is a vastly complex process, requiring large, secure, and safe facilities performing highly specialized and top-secret work with one of the world's most toxic substances—and the NNSA is restarting this complex process essentially from scratch. Starting a complex manufacturing process from zero requires specialized knowledge and functional expertise that the NNSA no longer has. To ensure that pit production takes place on schedule, the NNSA should either hire project management experts from the private sector or contract with a private sector firm to design and execute pit production. This functional expertise in complex project management only exists in a handful of firms, such as multinational petrochemical companies, Navy shipbuilders, or other complex manufacturing enterprises. The NNSA will need this functional expertise to make pit production a reality.

Conclusion

The United States is building the nuclear deterrent that it will field for the next half century. It cannot do that without a responsive nuclear infrastructure. However, that nuclear infrastructure does not exist. The United States must invest in such an infrastructure now if it is to deter its adversaries in the 21st century.

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Endnotes

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