

Plutonium Pit Production

The Risks and Costs of US Plans to Build New Nuclear Weapons

HIGHLIGHTS

The United States is planning a \$1.7 trillion overhaul of its entire nuclear arsenal, designing new warheads and investing in new bombers, missiles, and submarines to carry them. The new warheads, in turn, are driving demand for new plutonium “pits”—the bomb cores that begin the chain reaction in every US thermonuclear weapon—despite the fact that the United States has thousands of surplus pits in reserve.

Producing new pits would not only be expensive, time consuming, and logistically challenging, but is also technically unnecessary and politically destabilizing. It would actually decrease national security by encouraging a new arms race. In addition, a rushed program will likely increase health risks to workers and communities.

Science shows we can count on the reliability of existing plutonium pits. There are other ways to improve security without the risks and costs of producing new pits.

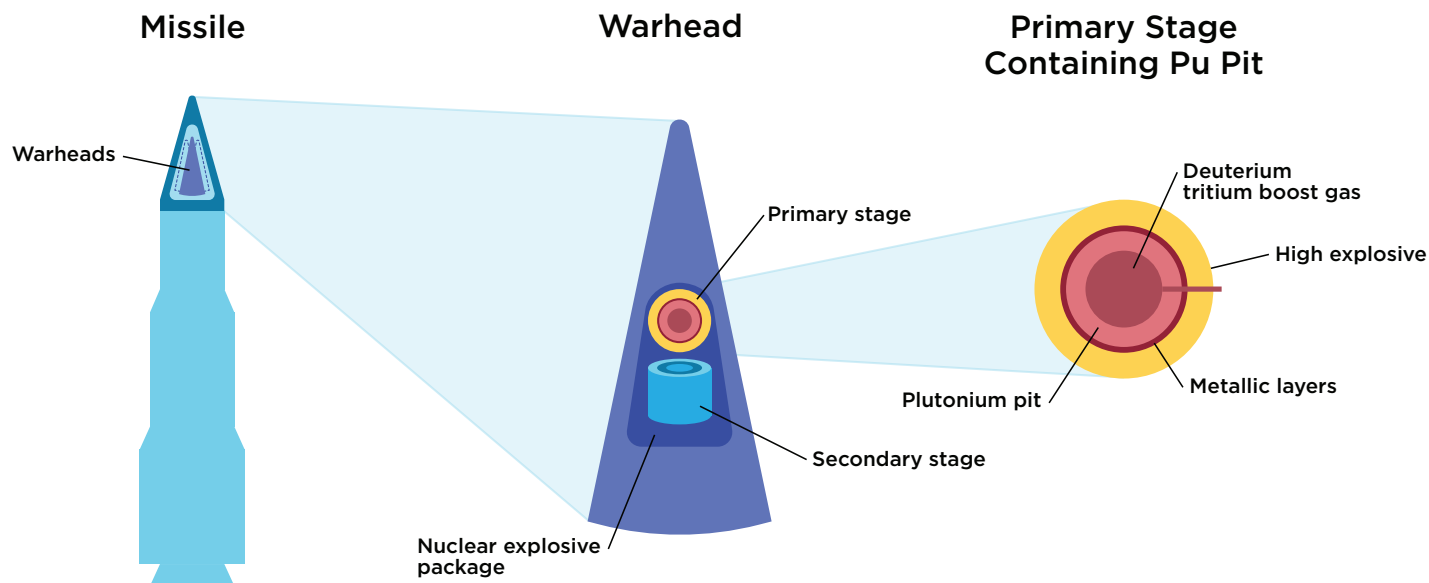
The US nuclear weapons complex is undergoing a significant transformation. Since the end of the Cold War, the core responsibility of the complex—the national laboratories and the industries that support them—has ensured the safety, security, and reliability of existing nuclear weapons. Now the United States plans a \$1.7 trillion overhaul of its entire nuclear arsenal—newly designing warheads and investing in new bombers, missiles, and submarines to carry them. The new warheads, in turn, are driving demand for the weapons complex to produce new plutonium “pits,” the bomb cores that begin the chain reaction in every thermonuclear weapon in the US arsenal (see Figure 1, p. 2).

The United States has not manufactured new plutonium pits in significant numbers since 1989 but has thousands of surplus pits in reserve from disassembled weapons. Not only is resuming production expensive, time consuming, and logistically challenging, but the United States clearly will not meet its ambitious goals for reviving this capability. Even more importantly, plans for nuclear modernization, associated pit production, and new nuclear warheads are technically unnecessary and politically destabilizing—and they decrease US security. Additionally, a rushed program will likely increase the risks to the workers and front-line communities who bear still unaddressed burdens from the production of nuclear weapons during the Cold War.



The National Nuclear Security Administration has mandated that Los Alamos National Laboratory in New Mexico produce 30 pits per year. The 50-year-old facility has a troubling safety record and faces logistical and technical challenges to meeting this mandate.

FIGURE 1. Plutonium “Pits”: The Core of US Thermonuclear Weapons



Left: Intercontinental and submarine-launched ballistic missiles, among other delivery vehicles, can deliver one or more nuclear warheads. Center: The warhead's nuclear explosive package contains materials that undergo nuclear fission and fusion, unleashing huge amounts of energy. Right: The plutonium pit is a hollow shell within the weapon's primary stage. When imploded by high explosives, it drives fission reactions that set off the weapon; the nuclear chain reaction is what renders such weapons so destructive.

Note: Diagram not to scale.

Several viable alternatives to the government's plans would reduce risk and cost, increase safety, improve national security, and avoid fueling a new, multipolar arms race. The United States can achieve these goals without compromising the safety, security, and reliability of its existing nuclear arsenal. The scientific consensus on plutonium aging supports both the ongoing reliability and long service life of existing pits.

This report offers a comprehensive and critical examination of US plans for producing plutonium pits, including the history of pit production and a review of the current proposal to resume production. It explains the available science on plutonium aging, the rationales for the new production plan, and the potential human and environmental impacts. And it presents alternatives that would not require the proposed massive enterprise.

An Unnecessary, Unachievable Plan

Since 2015, Congress has mandated—and the Department of Energy's National Nuclear Security Administration (NNSA) has been attempting to achieve—the production of at least

80 plutonium pits per year by 2030. Yet sustaining the current US nuclear arsenal requires no pit production at all.

While public rationales for the program often emphasize a need to replace aging pits, the national laboratories have offered no evidence that the nation's existing pits are anywhere near the end of their service lives. Nor is the plutonium in those pits currently at risk of age-related failure that would reduce the safety, security, or reliability of present warhead designs. Moreover, the national laboratories can use existing capabilities to monitor any potential for aging effects without reviving pit production.

The NNSA has itself declared the goal of producing 80 pits per year by 2030 unachievable. Nonetheless, the United States is developing pit-production facilities at two locations: the Los Alamos National Laboratory (LANL) in New Mexico and the Savannah River Site (SRS) in South Carolina. Neither new facility is intended to sustain the existing US nuclear arsenal. Instead, the primary aim is to furnish pits for new types of nuclear warheads for deployment on land-based and submarine-launched missiles.

The barriers to the program's success are formidable. Since the congressional mandate, Los Alamos has produced just a

single pit certified for use (in 2024). Meanwhile, facility constraints, workforce issues, and a troubling accident history all challenge LANL. SRS, with an incomplete budget already surpassing \$25 billion, is likely a decade away from producing even one pit.

The entire project is years into development and has a potential cost of tens of billions of dollars, yet there is no master schedule or official cost estimate. Congress has requested—but failed to require—such estimates before allocating more funding. The lack of rigorous oversight is particularly concerning because all previous efforts to revive pit production have failed and at enormous cost.

Pit production is years into development already but still lacks a complete cost estimate or master schedule.

Dangerous to Communities, Dangerous for the United States

Rushing to meet an arbitrary, unnecessary deadline heightens the risks for the workforce recruited to carry out complex, hazardous plutonium processing. LANL's plutonium facility has a troubling record of recent safety violations, worker exposure to plutonium, and fires and floods. The program there appears to have prioritized expediency and cost-savings over safety. This endangers the workforce and the local community—as well as the program itself should a significant accident occur.

Pit production is resulting in LANL's largest expansion of workforce and infrastructure since the lab's inception during World War II. However, the NNSA's environmental impact assessments for the work there insufficiently address these sweeping changes, instead documenting impacts only after the fact and without adequately assessing potential future impacts. A federal court recently found the NNSA's assessment of its pit production efforts legally deficient and mandated a new analysis.

Meanwhile, frontline communities in New Mexico and South Carolina must reckon with the prospects of resumed pit production. At the same time, they continue to face the consequences of unremediated environmental contamination and harm from past activities for which there is little accountability, understanding, or reparation.

The risks extend beyond the two pit-production sites and their surroundings. Manufacturing plutonium pits increases the production and transportation of hazardous materials, waste,



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The Savannah River Site (SRS) in South Carolina is one of two facilities being prepared to meet a 2030 deadline for plutonium pit production. SRS is partially completed, its budget already exceeds \$25 billion, and it is likely a decade away from producing its first pit.

and weapons components (including plutonium) across the country. But the sole US repository for nuclear waste faces its own challenges and problematic safety history; it is unclear if it can accommodate the waste stream from pit production.

Nor can the true cost of new nuclear weapons be quantified solely in financial terms even considering the risks to workers and communities. The geopolitical cost of modernizing will reverberate for decades as the United States doubles down on its reliance on a nuclear arsenal, further stimulating an already accelerating arms race. Nuclear modernization is a choice, not a necessity. It is a choice that comes with substantial monetary, environmental, and geopolitical costs.

Alternatives for a More Secure Future

Fortunately, the nation has options that do not detract from the safety, security, and reliability of the existing nuclear arsenal—options that would eliminate the immediate need for pit production, reduce programmatic risk, and save billions. The United States could retain existing warheads, using its national laboratories' proven expertise in stockpile stewardship and in extending the lives of nuclear weapons. Without jeopardizing national security, the nation could keep to its policy of one warhead on each land-based missile or (preferably) eliminate its land-based missiles altogether. And it could reuse some of the thousands of surplus pits presently in storage. The nation could maintain pit production at an R&D level with existing infrastructure until (or even if) it becomes necessary for stewardship of the existing arsenal.

As a signatory to the Nuclear Nonproliferation Treaty, the United States is obligated to work toward nuclear disarmament. Alternatives to pit production can help the nation fulfill this obligation rather than move toward a dangerous and costly dependence on an existentially threatening technology.

The United States does not need to make any new pits to maintain a safe, reliable nuclear arsenal for decades to come. Plutonium aging does not require resuming pit production at this time.

Recommendations

- Congress and the NNSA should limit plans for pit production to the minimum required for research and stewardship of the present stockpile. They should cancel plans for the Savannah River Site, which is still a decade away from production. The United States does not need to make any new pits to maintain a safe, reliable arsenal for decades to come, and plutonium aging is not a viable motive for resuming pit production at this time. Existing infrastructure can maintain technical capability and pit surveillance.
- Before allocating additional funding for pit production, Congress should require integrated cost and schedule projections for the project, mandate a study on the reuse of existing pits, and prioritize ongoing studies of plutonium aging. It should eliminate the current goal of producing 80 pits per year.
- To discourage a budding nuclear arms race and increase global security, the US should pursue alternatives to the nuclear triad of nuclear-armed strategic bombers and land- and sea-based intercontinental ballistic missiles. This would be in line with US obligations to work toward disarmament under the Nuclear Nonproliferation Treaty. Viable alternatives include eliminating the land-based missiles and cancelling programs for newly designed nuclear warheads.
- The Department of Energy and the NNSA must place a higher priority on the safety and well-being of workers and frontline communities. They should remediate existing environmental harm and conduct transparent, comprehensive environmental impact studies that acknowledge the cumulative risks associated with pit production.

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