

## Why GAO Did This Study

The Department of Defense (DOD) and NNSA restarted a program in fiscal year 2019 to replace the capabilities of the aging W78 nuclear warhead with the W87-1. NNSA made key design decisions for this weapon from 2010 until the program was paused in 2014. NNSA estimated in December 2018 that the W87-1 would cost \$8.6 billion to \$14.8 billion, which could make it the most expensive warhead modernization program to date. NNSA plans to newly manufacture the entire warhead, including the two major nuclear components, called the primary and secondary, using facilities it is modernizing or repurposing.

You asked us to examine plans for the W87-1 warhead. This report examines, among other things, the extent to which NNSA (1) considered cost estimates in prior design decisions for the W87-1 and the potential effects of remaining design decisions on program cost, and (2) will be able to produce sufficient numbers of key nuclear components to meet W87-1 production needs. GAO reviewed NNSA documentation on prior and remaining design decisions and preliminary cost estimates, reviewed warhead and component production schedules, and interviewed NNSA and DOD officials.

## What GAO Recommends

GAO is making four recommendations, including that NNSA require programs such as the W87-1 to follow analysis of alternatives best practices when studying design options and that the plutonium program build an integrated schedule consistent with schedule best practices. NNSA generally agreed with the recommendations.

View [GAO-20-703](#). For more information, contact Allison B. Bawden at (202) 512-3841 or [bawdena@gao.gov](mailto:bawdena@gao.gov).

# NUCLEAR WEAPONS

## NNSA Should Further Develop Cost, Schedule, and Risk Information for the W87-1 Warhead Program

### What GAO Found

The National Nuclear Security Administration (NNSA) did not consider cost estimates in early major design decisions for the W87-1 warhead because it was not required to do so, but NNSA has since changed its guidance to require that cost be considered, according to a May 2019 NNSA review of program documentation. The design decisions that remain for features that would achieve either minimum or enhanced requirements for the W87-1 could affect cost, according to NNSA officials (see table). We found, however, that NNSA did not yet have study plans for assessing the costs and benefits of the remaining decisions consistent with best practices as detailed in NNSA's analysis of alternatives business procedure. NNSA does not require and only recommends that programs such as the W87-1 follow these best practices. By directing the W87-1 program and future weapons programs to follow best practices for design studies, or to justify and document deviations, NNSA would have better assurance that design studies apply consistent, reliable, and objective approaches.

### NNSA Cost Estimates for W87-1 Warhead Design Variations That Meet Minimum and Enhanced Requirements, as of December 2018

(Dollars in billions)

W87-1 design variations	Cost estimate range <sup>a</sup>
Design includes features that meet minimum safety and security requirements	7.7 - 13.3
Design includes enhanced safety and security features	8.6 - 14.8
Difference between the above estimate ranges	0.9 - 1.5

Source: National Nuclear Security Administration (NNSA) documentation | GAO-20-703

<sup>a</sup>The cost ranges reflect low and high estimates for a single design variation. The ranges represent technical and production risk and uncertainty.

It is not clear that NNSA will be able to produce sufficient numbers of pits—the fissile cores of the primary—to meet the W87-1 warhead's planned production schedule. Recent NNSA and independent studies have cast doubt on NNSA's ability to ready its two planned pit production facilities in time. If one facility is not ready to produce pits in the early 2030s, for example, NNSA would likely produce fewer weapons than planned, according to GAO's analysis of NNSA plans.

We were unable to fully assess the extent to which the two pit production facilities will be ready to produce pits for the W87-1 because NNSA's plutonium program—which is managing the facility readiness efforts—has not yet completed an integrated schedule for the overall pit production effort. An integrated schedule is important, according to best practices, because it integrates the planned work, resources, and budget. An NNSA official stated that the program was building a schedule, but could not provide documentation that it would meet best practices. A schedule consistent with best practices would provide NNSA with better assurance that it will have adequate pits to meet planned W87-1 production.

This is a public version of a classified report that GAO issued in February 2020. Information that NNSA or DOD deemed classified or sensitive has been omitted.