

How Is the U.S. Preparing for the Second Nuclear Age?

DID YOU KNOW THAT:

In the Second Nuclear Age, eight nations have nuclear weapons.

Terrorist organizations seek to acquire nuclear weapons.

Seven of the eight nuclear-armed nations continue to invest heavily in their nuclear capabilities. They are building new, modern nuclear warheads *and* delivery systems to improve their weapons' military characteristics—for example, their range and performance—and to diversify their warhead types. Several nations are believed to also be *increasing* the size of their nuclear arsenals.

What Is the United States Doing?

The U.S. nuclear stockpile deters our adversaries and assures our allies *every day*.

But in contrast to what the other nuclear-armed nations are doing, the United States has not deployed a new warhead type since 1989, or a new launch platform since 1997. Its current nuclear weapons were designed in the 1960s and 70s; the last one was built in 1991. Although other nations have tested their nuclear weapons since 1992, the United States has not.

The United States is dramatically *reducing* the diversity and the number of its weapons. As the size of the stockpile decreases, the need to ensure that the remaining weapons will work increases.

Life-Extension Programs

Instead of building new, modern nuclear weapons, the United States is working to extend the life of its current weapons, which were built decades ago, with a designed life-expectancy of about 10 years. These life-extension programs (LEPs) rely on samples taken annually of the various types of weapons in the stockpile. These sample weapons are “autopsied” to determine the actual condition of the weapon components and evaluate if they still meet design intent. Over time, this process assesses how components are aging and if they will need to be replaced at some point in the future.

In some cases, only a single component will be replaced. In other cases, multiple components have aged to the point where a more general refurbishment, or life extension project, of the weapon is more cost-effective. The end result is a weapon that looks and functions the same as the original weapon, but its service lifetime has been extended for years into the future.

The B61 thermonuclear gravity bomb (meant to be dropped like a conventional bomb from military aircraft) is a case in point.

B61 Gravity Bomb LEP

Los Alamos designed and engineered the B61 in 1963. Production began in earnest by 1967. Most B61s were produced in the 1970s, and production ended by about 1989. The B61 is the oldest type of nuclear weapon in the stockpile. Over the years, the B61 has been modified many times to meet new military requirements. The last model built, the B61-11 (or B61 Mod 11, where 11 refers to the model, or modification, number), was deployed in 1997.

The B61 LEP is underway at Los Alamos and at other nuclear weapons facilities; different facilities are responsible for different aspects of this LEP—Los Alamos is responsible for extending the life of the nuclear warhead inside the bomb. The LEP will increase the B61's safety, security, and reliability and help ensure it remains in the stockpile until 2025.

In addition to extending its life with repaired or replaced components, the LEP will outfit the bomb with a new “tail kit,” which will enable the bomb to be precision-guided and extremely accurate. Together, the tune-up and the new tail kit will result in the B61-12.

Put to the Test

This February, scientists from Los Alamos and Sandia National Laboratories put some of their B61 LEP work to the test.

In particular, they examined how their modifications would behave in both routine and extreme environments and in various “accident scenarios.” These highly complex bombs (think: more complex than the finest-made mechanical Swiss watch) have it rough. If called into service, these bombs will go from being in storage to being loaded on aircraft and flown at supersonic speeds at ultrahigh altitudes—before being dropped. They must undergo the most-extreme temperature and pressure changes, vibrations, shocks, and other insults, which together push their components—new and old—to their limits. Yet after taking this brutal beating, the B61-12 *has to work flawlessly*.

The tests were successful. After reviewing the results, Don Cook, the National Nuclear Security Administration's deputy administrator for defense programs, described them as “a significant achievement [that] gives us confidence in our ability to move forward with our efforts to increase the safety and security of the bomb.” ✦