

## US Redesigning Atomic Weapons

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**NY Times:** American scientists have begun designing a new generation of nuclear arms meant to be sturdier and more reliable and to have longer lives. Critics say this could needlessly resuscitate the complex of factories and laboratories that make nuclear weapons and could possibly ignite a new arms race.

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By WILLIAM J. BROAD

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Worried that the nation's aging nuclear arsenal is increasingly fragile, American scientists have begun designing a new generation of nuclear arms meant to be sturdier and more reliable and to have longer lives, federal officials and private experts say.

The officials say the program could help shrink the arsenal and the high cost of its maintenance. But critics say it could needlessly resuscitate the complex of factories and laboratories that make nuclear weapons and could possibly ignite a new arms race.

So far, the quiet effort involves only \$9 million for warhead designers at the nation's three nuclear weapon laboratories, Los Alamos, Livermore and Sandia. Federal bomb experts at these heavily guarded facilities are now scrutinizing secret arms data gathered over a half century for clues about how to achieve the new reliability goals.

The relatively small initial program, involving fewer than 100 people, is expected to grow and produce finished designs in the next 5 to 10 years, culminating, if approval is sought and won, in prototype warheads. Most important, officials say, the effort marks a fundamental shift in design philosophy.

For decades, the bomb makers sought to use the latest technologies and most innovative methods. The resulting warheads were lightweight, very powerful and in some cases so small that a dozen could fit atop a slender missile. The American style was distinctive. Most other nuclear powers, years behind the atomic curve and often lacking top skills and materials, settled for less. Their nuclear arms tended to be ponderous if dependable, more like Chevys than racecars.

Now, American designers are studying how to reverse course and make arms that are more robust, in some ways emulating their rivals in an effort to avoid the uncertainties and deteriorations of nuclear old age. Federal experts worry that critical parts of the arsenal, if ever needed, may fail.

Originally, the roughly 10,000 warheads in the American arsenal had an expected lifetime of about 15 years, officials say. The average age is now about 20 years, and some are much older. Experts say a costly federal program to assess and maintain their health cannot ultimately confirm their reliability because a global test ban forbids underground test detonations.

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In late November, Congress approved a small, largely unnoticed budget item that started the new design effort, known as the Reliable Replacement Warhead program. Federal officials say the designs could eventually help recast the nuclear arsenal with warheads that are more rugged and have much longer lifetimes.

"It's important," said John R. Harvey, director of policy planning at the National Nuclear Security Administration, which oversees the arsenal. In an interview, he said the goal of the new program was to create arms that are not only "inherently reliable" but also easier to make and certify as potent.

"Our labs have been thinking about this problem off and on for 20 years," Dr. Harvey said. "The goal is to see if we can make smarter, cheaper and more easily manufactured designs that we can readily certify as safe and reliable for the indefinite future - and do so without nuclear testing."

Representative David L. Hobson, an Ohio Republican and chairman of the House Appropriations Subcommittee on Energy and Water Development, praised the program in a speech on Thursday and said it could lead to an opportunity for drastic cuts in the nation's nuclear arsenal.

"A more robust replacement warhead, from a reliability standpoint," Mr. Hobson said, "will provide a hedge that is currently provided by retaining thousands of unnecessary warheads."

But arms control advocates said the program was probably unneeded and dangerous. They said that it could start a new arms race if it revived underground testing and that its invigoration of the nuclear complex might aid the design of warheads with new military capabilities, possibly making them more tempting to use in a war.

"The existing stockpile is safe and reliable by all standards," Daryl G. Kimball, executive director of the Arms Control Association in Washington, said in an interview. "So to design a new warhead that is even more robust is a redundant activity that could be a pretext for designing a weapon that has a new military mission."

The reliability issue goes back to the earliest days of the nuclear era. At first, the bombs were huge and trustworthy. The first one, dropped in 1945, weighed five tons. The first deliverable hydrogen bomb, which made its debut in 1954, weighed four times as much and had hundreds of times the destructive power. It measured nearly 25 feet long from nose to tailfins.

Over the decades, American designers worked hard to trim the dimensions. Small size was prized for many reasons. It meant that warheads could fit into cramped, narrow missile nose cones, which streaked to earth faster than blunter shapes and were less buffeted by winds during the fiery plunge, making them more accurate. It also meant that ships, bombers and submarines could carry more nuclear arms.

By the 1970's, warheads for missiles weighed a few hundred pounds and packed the power of dozens of Hiroshima-sized bombs. The arms continued to shrink and grow more powerful. The

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last one for the nation's arsenal was built around 1990.

Designers had few doubts about reliability because they frequently exploded arms in Nevada at an underground test site. But in 1992, after the cold war, the United States joined a global moratorium on nuclear tests, ending such reassurances.

In response, the federal government switched from developing nuclear arms to maintaining them. It had its designers work on computer simulations and other advanced techniques to check potency and understand flaws that might arise.

The cost of the nuclear program began at \$4 billion a year. It is now more than \$6 billion and includes a growing number of efforts to refurbish and extend the life of aging warheads.

By the late 1990's, top officials and experts began to openly question whether such maintenance could continue to stave off deterioration and ensure the arsenal's reliability. As a solution, some called for a new generation of sturdier designs.

The new program involves fewer than 100 full- and part-time designers and other experts and support staff, said Dr. Harvey, of the National Nuclear Security Administration.

"There's not a lot of hardware," he added. "It's mostly concept and feasibility studies that don't require much fieldwork."

Dr. Harvey emphasized that the effort centered on research and not arms production. But he said the culminating stages of the program would include "the full-scale engineering development" of new prototype warheads. Both Congress and a future administration would have to approve the costly, advanced work, and an official said no decision had been made to seek such approval.

The current goal of the program, Dr. Harvey said, is to "relax some of the design constraints imposed on the cold war systems." He added that a possible area of investigation was using more uranium than plutonium, a finicky metal that is chemically reactive.

He said the new designs would also stress easier manufacturing techniques and avoid hazardous and hard-to-find materials.

"Our goal is to carry out this program without the need for nuclear testing," Dr. Harvey said. "But there's no guarantees in this business, and I can't prove to you that I can do that right now."

Another official, speaking on the condition of anonymity because the topic is politically delicate, said that such testing would come only as a last resort and that the Bush administration's policy was to maintain the moratorium.

The program, Dr. Harvey said, should produce a wide variety of designs. The Defense Department, which is participating in the effort, will help decide which weapons will be replaced, he said.

"What we're looking at now is a long-term vision," Dr. Harvey said. "We're trying to flesh this out

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and understand the path we need to be on, and to work with Congress to get a consensus."

Some critics say checking the reliability of the new designs is likely to require underground testing, violating the ban and inviting other nations to do the same, thereby endangering American security.

Dr. P. Leonardo Mascheroni, a former Los Alamos scientist who is critical of the new program, said that it would require not only testing but also changes in delivery systems costing "trillions of dollars" because of its large, heavy warheads. Federal officials deny both assertions, saying the goal is to have new designs fit existing bombers and missiles.

Dr. Mascheroni has proposed that federal designers make lighter, robust warheads and confirm their reliability with an innovative system of tiny nuclear blasts. That would still require a revision of the test ban treaty, he said in an interview, but it would save a great deal of money and avoid the political firestorm that would probably accompany any effort to resume full-scale testing. Robert S. Norris, a senior nuclear expert at the Natural Resources Defense Council, a private group in Washington that advocates arms control and monitors nuclear trends, said too little was known publicly about the initiative to adequately weigh its risks and benefits, and that for now it raised more questions than it answered.

"These are big decisions," Mr. Norris said. "They could backfire and come back to haunt us."

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