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Lab officials excited by new H-bomb project

By Ian Hoffman, STAFF WRITER

For the first time in more than 20 years, U.S. nuclear-weapons scientists are designing a new

H-bomb, the first of probably several new nuclear explosives on the drawing boards.

If they succeed, in perhaps 20 or 25 more years, the United States would have an entirely new nuclear arsenal, and a highly automated factory capable of turning out more warheads as needed, as well as new kinds of warheads.

"We are on the verge of an exciting time," the nation's top nuclear weapons executive, Linton Brooks, said last week at Lawrence Livermore weapons design laboratory.

Teams of roughly

20 scientists and engineers at the nation's two laboratories for nuclear-explosive design — Livermore and Los Alamos in New Mexico — are in a head-to-head competition to offer designs for the first of the new thermonuclear explosives, termed "reliable replacement warheads" or RRWs.

Designers are aiming for bombs that will be simpler, easier to maintain over decades and, if they fell into terrorists' hands, able to be remotely destroyed or rendered useless. Once the designs are unveiled in September, the Bush administration and Congress could face a major choice in the future of the U.S. arsenal: Do they keep maintaining the existing, tested weapons or begin diverting money and manpower to developing the newly designed but untested weapons?

Administration officials see the new weapons and the plant to make them as "truly transformative," allowing the dismantlement of thousands of reserve weapons.

But within the community of nuclear weapons experts, the notion of fielding untested weapons is controversial and turns heavily on how much the new bombs would be like the well-tested weapons that the United States already has.

"I can't believe that an admiral or a general or a future president, who are putting the U.S. survival at stake, would accept an untested weapon if it didn't have a test base," said physicist and Hoover Institution fellow Sidney Drell, a longtime adviser to the government and its labs on nuclear-weapons issues.

"The question is how do you really ensure long-term reliability of the stockpile without testing?" said Hugh Gusterson, an MIT anthropologist who studies the weapons labs and their scientists. "RRW is partly an answer to that question and it's an answer to the question (by nuclear weapons scientists) of 'What do I do to keep from being bored?'"

The prize for the winning lab is tens, perhaps hundreds of million of dollars for carrying its bomb concept into prototyping and production. If manufactured, the first RRW would replace two warheads on submarine-launched missiles, the W76 and W88, together the most numerous active weapons and the cornerstone of the U.S. nuclear force.

Altogether, the nation has 5,700 nuclear bombs and warheads of 12 basic types, plus more than 4,200 weapons kept in reserve as insurance against aging and failure of the active, fielded arsenal.

Most are 25-35 years old. All were exploded multiple times under the Nevada desert before U.S. nuclear testing halted in 1992. It is in most respects the world's most sophisticated nuclear arsenal, and beyond opposition at home to continued testing, ending testing made sense to discourage other nations from testing to advance their nuclear capabilities.

Faced by the Soviet Union, Cold War weapons scientists devised their bombs for the greatest power in the smallest, lightest package, so thousands could be delivered en masse and cause maximum destruction. Designers compare those weapons to Ferraris, sleek and finely tuned.

Scientists at the weapons laboratories are laboring to keep the bombs and warheads in working order, by examining them for signs of deterioration and replacing parts as faithfully to the original manufacturing as possible. It is an expensive and not especially stimulating job.

Some worry that an accumulation of small changes could undermine the bombs' reliability. So far, every year since 1995 directors of the weapons labs and secretaries of defense and energy have assured two presidents that the weapons are safe, secure and will detonate as designed.

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The new reliable replacement warheads are actually an old idea that 1950s-era weapons designers called, with some disdain, the "wooden bomb." Bomb physicists were proud of their racier, more compact designs and figured they were plenty dependable already. The wooden bomb by comparison was boring.

"They said, 'Well heck, that isn't a challenge to anybody'," recalled Ray Kidder, a former Livermore physicist who found a chilly reception to proposals in the 1980s for clunkier, more reliable designs. "It was like saying, 'Well, why don't you make a Model A Ford.'"

Now the wooden bomb is back in vogue. With fewer, simpler kinds of warheads, the argument goes, the arsenal could be maintained more inexpensively

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and — assuming construction of a factory to turn out the new bombs on demand — thousands of reserve warheads could be scrapped.

But in a sharp break with the past, the new bombs would never be exploded except in war. The only button-to-boom tests of the new arsenal would be virtual — simulated detonations inside a supercomputer.

Today's weaponeers say they've learned enough of the complex physics of thermonuclear explosives to guarantee the bombs would deliver precise explosive yields even after decades on the shelf. If military leaders agreed, the most lethal and final resort of U.S. defenses would be deployed without a test shot.

Ex-military leaders are split on accepting a new, untested nuclear arsenal.

Former Deputy Secretary of Defense John Hamre told a House appropriations committee last year that he thinks a new arsenal will be needed some day. But he said, "I do believe we should test the new weapons to demonstrate to the world that they are credible."

Eugene Habiger, the senior-most commander over U.S. nuclear forces as chief of Strategic Command in the mid-1990s, said he would be inclined to accept the new weapons.

"The science is pretty well understood," he said.

The Bush administration and weapons scientists say the warheads will not have new military missions. They will ride on the same bombers and missiles as today's nuclear explosives and strike the same targets. But administration officials are talk of eventually wanting features beyond the sizable array of explosive yields and delivery methods available now: deep earth-penetrating bombs, enhanced radiation weapons and "reduced collateral damage" bombs with lower fission radiation.

Designers and executives at Lawrence Livermore are taking a conservative line. The lab's weapons chief, Bruce Goodwin, talks of starting with nuclear-explosive designs that are well tested and well understood.

"Our plan is to develop a design that lies well within the experience — and within what we call the 'sweet spot' — of our historical test base," he said in a recent statement.

One candidate under consideration as a starting point is the W89, a 200-kiloton warhead designed for a short-range attack missile. It is well-tested, plus it comes from a long line of well-understood designs and uses every safety and security feature available at the time.

Yet weaponeers at Los Alamos lab and Brooks, as the head of the National Nuclear Security Administration, have talked of a more freewheeling design effort.

"This is not about going back to rake over old designs. That's why I've got two different teams of weapons scientists at two labs working on this," Brooks said. "There's never been anything tested that will do the sorts of things we want to do."

Such talk alarms Stanford's Drell.

"How the hell do you make a new design without testing?" he said. "Those kinds of flamboyant statements worry me because I don't believe we could maintain a confident stockpile with new designs that haven't been tested."

Some former weapons scientists say the wiser course is maintaining the current arsenal and boosting its reliability in simple ways, such as adding more tritium to "sweeten" the hydrogen gases at the very core of the weapon.

"We've got a reliable stockpile. We have a test base for it. We have now in the last 10 or 15 years far more sophisticated computational abilities than we had doing these designs originally, so things are extremely well understand in terms of the performance," said Seymour Sack, once Livermore's most prolific designer, whose innovations are found in nearly every U.S.

weapon. "I don't see any reason you should change those designs."

Lawmakers say they are watching carefully to make sure the new warheads hew closely to existing, well-understood designs. But in a recent report on the new warhead program for the Livermore watchdog group, Tri-Valley CAREs, former White House budget analyst Bob Civiak said Congress has a poor record of restraining the weapons design labs from what after all they were built to do.

"Congress thinks it can allow the labs to design new nuclear weapons but restrict them to existing designs," he said. "History shows that cannot be the case."

Contact Ian Hoffman at ihoffman@angnewspapers.com.

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