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U.S. Air Force Might Modify Nuclear Bomb

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WASHINGTON — For the first time in more than a decade, the U.S. Air Force is studying the option of adding significant new features to one of its aging atomic bombs, according to a senior service official (see *GSN*, Sept. 12).

The proposed modifications to the B-61 gravity bomb — which service officials are dubbing the "B-61 Mod 12" — would exceed the extent of parts repair or replacement typically performed to increase a weapon's service life.

The new plans would infuse the bomb — originally designed and built in the 1960s — with state-of-the-art capabilities to reduce the risk of theft and prevent an accidental detonation, the senior Air Force official said in a Sept. 10 interview. The official asked not to be identified because of sensitivities associated with discussing the attributes of U.S. nuclear weapons.

The initiative would also lend the weapons another 20 to 30 years of service life, a service spokesman said.

Yet the inclusion of a large array of upgrades in the overhaul could raise hackles on Capitol Hill, where lawmakers have strongly opposed anything that appears to be a "new" nuclear weapon.

Beginning with an initial design investment of roughly $120 million over the next two years, the Mod 12 would eventually replace all but the very newest versions of the B-61, the official said.

As many as 920 B-61 Mods 3, 4 and 7 could undergo the upgrades beginning as early as 2015, though the figures could decline if the arsenal shrinks in the coming years, the official said. An estimated 35 B-61 Mod 11s remaining in the force are modern enough that they would not have to undergo the refurbishment.

The move comes in response to congressional rejection of Bush administration efforts to develop a new nuclear warhead to modernize the entire U.S. arsenal. For the second year in a row, Capitol Hill has zeroed funding for the Reliable Replacement Warhead, touted as offering increased reliability, maintainability, safety and security relative to today's stockpile (see *GSN*, July 10).

Lawmakers have demanded that the government show how such a new weapon would fit

into its overarching nuclear strategy before they would consider funding.

One key sticking point has been concern about building a new nuclear warhead at a time when the United States is spearheading efforts to discourage proliferation around the globe. Another worry is that the Energy Department might need to test the design through underground explosions, despite a U.S. moratorium in place for more than a decade.

"It's dead under this administration, that's pretty clear," the senior service official said of the Reliable Replacement Warhead. "Let's see what happens in a new administration. But it's not going to come out of this one."

Both presidential candidates have left open the possibility of developing a new nuclear warhead, while still expressing a degree of caution. Senator Barack Obama (D-Ill.) has said he does not support "a premature decision to produce" the weapon, while Senator John McCain (R-Ariz.) has said he would support only a warhead "that is absolutely essential for the viability of our deterrent" and helps facilitate force reductions.

A Demand for 'Real Estate'

Air Force interest in an expanded upgrade effort aligns with a new approach laid out recently by U.S. Strategic Command, under which some of the advanced technologies previously imagined for the Reliable Replacement Warhead might now be retrofitted into existing weapons as they undergo maintenance. The idea would be to fulfill as many RRW objectives as possible without a wholesale replacement of the warhead.

The Energy Department's semiautonomous nuclear weapons agency has said that short of building a new Reliable Replacement Warhead, it is already incorporating all the safety and security features it can into existing weapons in the stockpile via ongoing Life-Extension Programs.

The National Nuclear Security Administration view reflects size and yield constraints on the current array of weapons in the U.S. stockpile, according to experts. However, if the Pentagon could either increase the size of a given weapon system or reduce its explosive yield, additional safety and security features imagined for the replacement warhead might instead be incorporated into existing hardware as it is overhauled, the Air Force official said.

"It's that sort of thing that really allows you to get into this design space, that gives you a little more margin, without testing," Siegfried Hecker, a former director of the Los Alamos National Laboratory in New Mexico, said in a telephone interview this week.

While declining to describe specific safety and security upgrades under contemplation, the Air Force representative said they are modifications that "we know how to do, but they take 'real estate' [inside the weapon package]. They take volume. They take weight and mass."

The official explained that desired security features would improve on "permissive action links" that for years have served as "a lock on the door" of each nuclear warhead, the official said. Little public information is available about how such security devices work, but the Joint Chiefs of Staff describes them as mechanisms "in or attached to a nuclear weapon system to preclude arming and/or launching until the insertion of a prescribed discrete code or combination."

Amid growing concern about potential workarounds that might allow unauthorized access to a weapon, older permissive action links should be upgraded or replaced by the latest tools, the Air Force official argued. More modern devices might effectively neutralize the weapon upon any intrusion, this and other defense officials have said.

Moving to 'Plan B'

The service has received initial indications that Capitol Hill might be amenable to altering the B-61's size to allow for RRW-like improvements. However, legislators still might find it difficult to accept that the initiative remains within the bounds of a traditional Life-Extension Program, the official acknowledged.

"If you can put it in a bigger case, some people in the past thought that was not an LEP," the official said. It is even less clear whether lawmakers would allow a change in yield, the official said.

"We are in discussions with staffers on the Hill on that, [having] talked to some of the people on the authorization committees very recently," said the senior official. The service also planned to consult with the House and Senate appropriations committees "in the very near future," the official added.

"Initial feedback" has been that lawmakers might "allow some exploration in more volume [or to] change the shape" of the B-61, if that would open up space for additional safety and security features, the official said. However, in keeping with congressional mandates against creating a new atomic weapon, legislators want to preserve "the same military capabilities" that the B-61 currently has, the official said.

The Energy Department's nuclear weapons arm is wrapping up a limited life-extension effort for two variants of the B-61 — the Mod 7 and Mod 11 — that can be delivered by strategic bomber aircraft. John Broehm, an NNSA spokesman, said his organization would complete the refurbishment by the end of fiscal 2009.

The Air Force told the National Nuclear Security Administration "about a year ago" that it wanted to study expanding the scope of the B-61 life extension effort, given early congressional resistance to the replacement warhead idea, the service official said.

The study is scheduled to begin as of the new fiscal year next month. Depending on its results, the Air Force might offer the nuclear agency more detailed guidance on how much new room would be available on the bomb to include additional features.

"Say we can still meet the same mission … and we get agreement from the Hill that [we can] grow the case by, say — just to pull a number — an inch in diameter, and could add, say, 500 pounds of weight to the bomb," the Air Force official said. "[If] we show them it's the same mission set, and that's still a B-61 Mod 12, then they can do so much more."

The Air Force defines a "mod" as a change to a weapon that reflects new or different performance standards, such as explosive power or destructive capability against reinforced targets. Smaller changes, called "alterations," replace a part or subsystem but do not involve a change in performance. Life-extension efforts typically constitute only an alteration.

The first weapon the RRW program was to replace was the Navy's W-76 warhead. The initial concept for the B-61 Mod 12 grew out of plans for an RRW-2 weapon – a provenance that might not sit well with lawmakers who have opposed the replacement warhead.

The RRW-2 variant was to replace not only the B-61s but all air-delivered nuclear warheads, including cruise missiles, the official said.

"Remember, this is the second year in a row" that Congress has cut the replacement warhead from the administration's budget, the official told *GSN*. "[The] B-61's getting kind of long in the tooth. So a Mod 12 was always our backup if RRW did not go forward."

When House and Senate appropriators opted this year to deny funding again, "that was not a surprise," said the official. For the Air Force, "it was, 'OK, Plan B: Mod 12.'"

An Initial Look

While a boost in the B-61's casing might be more politically palatable, the upcoming life-extension study is also expected to assess how a decrease in yield might be traded for additional safety and security features, the senior service official said.

The service must assess whether a B-61 with less of an explosive punch would remain capable enough to reliably destroy the same targets as it could today, the official said.

Would the Air Force be able to "hold the same targets at risk?" asked the official, in describing performance alternatives the design study would consider. "What's the same? What can be allowed to change?"

The roughly $120 million required for the two-year assessment would likely come from an $80.4 million catch-all line item for "B-61 Stockpile Systems" in the fiscal 2009 NNSA budget, along with a projected $111.3 million for B-61 efforts in fiscal 2010.

Between 2010 and 2013, NNSA officials, "in coordination with the DOD, will initiate a new LEP for the B-61 while researching, developing, and producing required weapon upgrades/modifications," according to budget documents the nuclear organization provided to Congress this year.

The cost to actually undertake the B-61 life extension is unknown at this point, and "really depends upon what you put in," said the Air Force official. Cost estimates also vary depending on how many bombs would be upgraded.

A Nuclear Posture Review that the incoming presidential administration is expected to launch next year could lead to changes in the size of the U.S. arsenal. In turn, that could affect the quantity of B-61s undergoing life extension, the official said.

"The beauty of the timing here, though, is the engineering study needs to go on no matter whether you build 10 or 300 or 500," the official said. "So while the NPR's going on and we're deciding that path forward for the next administration, we still do that [B-61 design] work in parallel."

Ultimately all of the Air Force and Navy nuclear warheads would undergo life extension, absent a warhead-replacement program, a senior Strategic Command official said in an interview last month.

After initiating the B-61 bomb project, the weapon next up for Air Force life extension would be the Minuteman 3 ICBM's W-78 warhead. To improve that weapon's safety and security components, the Air Force would have fewer options compared to the gravity bomb.

Warheads customized for ballistic or cruise missiles cannot grow in size to accommodate additional features because they must continue to fit on their delivery platforms, the Air Force official noted. There is more latitude to change the size or shape of a gravity bomb, which is delivered from bomber or attack aircraft.

"You can gain some [room] with modern electronics. They're more compact than what we used in the '70s," the service official said. "And if that's not enough [for the W-78 modernization], then you need to get a smaller physics package, which makes a smaller yield."

The "physics package" includes all the explosive components of the warhead, so reducing its size to allow for the addition of other features would result in a less powerful weapon.

Along with the Energy Department, the Air Force is drafting a "Joint Life Extension Study" to lay out when each warhead in its stockpile should be modernized. The organizations launched the study over the past year and expect to complete it in fiscal 2009, the official said.

What Constitutes 'New'?

For the near term, as the Air Force crafts a more ambitious life-extension effort for the gravity bomb, it could run afoul of congressional efforts to block a new nuclear weapon, according to Jeffrey Lewis, head of the Nuclear Strategy and Nonproliferation Initiative at the New America Foundation.

However, Lewis said he would "not necessarily [be] opposed to an LEP approach" if it could offer safety or security benefits, short of building a new warhead.

"We don't know how far you can press the LEP program," said Hans Kristensen of the Federation of American Scientists. "Can you press it so far that it constitutes a new weapon?"

The Air Force official said that while the proposed changes would exceed a typical life extension, they would not require building a new "pit," the atomic core of a weapon. By contrast, officials planned on a new pit for the Reliable Replacement Warhead.

That distinction, combined with the widely supported objective of increasing nuclear weapons safety and security, might ultimately garner congressional support for the effort, according to several Washington insiders.

"If you can combine the best features of an RRW program" with a refurbishment of the existing stockpile, "then you've potentially got a more marketable product" on Capitol Hill, a House aide said last week.

To the extent that a B-61 Life-Extension Program "can incorporate more safety and security functions … that would be a good idea," Kristensen said. "Nobody is against that."

He added, though, that Capitol Hill should ensure that safety and security risks to U.S. nuclear warheads are assessed realistically so that the cost to modify the weapons remains reasonable.

"The question is: Who sets the requirement for how much safety is necessary?" said Kristensen, who directs his organization's Nuclear Information Project.

Similarly, without rigorous oversight, escalating concerns about the potential for nuclear terrorism could mean that virtually "anyone who comes around with new security features will get the go-ahead" to produce such components, he said.

Other thorny issues that first arose with the replacement warhead could also dog the new administration next year if it embraces the life-extension concept, several analysts noted. Among the questions raised would be whether warheads undergoing an expanded life extension could continue to be certified as reliable without explosive testing, the House aide said.

Hecker, the former Los Alamos lab director, advocates undertaking detailed studies and prototypes prior to any ambitious LEP overhauls, to prove the designs would be dependable

without underground tests.

"If you can't do it without testing, you can't do it," said Hecker, now a scholar at Stanford University's Center for International Security and Cooperation.

Expanded life-extension efforts "take you through as many questions as you had" with the Reliable Replacement Warhead, a program he supported, he said.

The Strategic Command official interviewed last month voiced confidence that additional life-extension measures could be implemented without a need to break a U.S. test moratorium in place since the early 1990s.

"I can test the fuses, I can test the high explosives that are in there, I can test a lot of the pieces. I can test all those both independently and [integrated] all the way to short of a [nuclear explosive] test," the senior command official said. "So I can tell you everything in the weapon short of nuclear explosion happens in the way we predict it to happen. We do that still today with the current weapons."

Another lingering uncertainty, even after an expanded life-extension effort is complete, is whether today's sizable stockpile of backup warheads would still be needed as a "hedge" against potential technical failures, the House aide noted.

The administration this week reaffirmed that, absent an RRW program, an unspecified number of warheads above a future 2,200 limit on operationally deployed weapons must be retained, in part to mitigate the risk of discovering any malfunctions in the aging arsenal (see *GSN*, Sept. 24). It is unclear if the emerging plans for life extension might alter that calculus.