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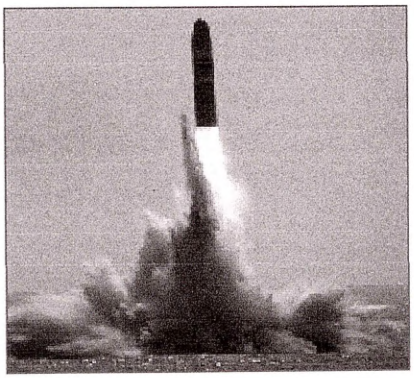
WASHINGTON -- The Obama administration is taking initial steps to develop a "common fuse" aimed at replacing aging firing devices in two different U.S. nuclear weapons, and could partner with the United Kingdom in developing the technology (see *GSN*, May 14, 2009).



(Jan. 7) - *The United States and the United Kingdom might jointly develop a single fuse for use on three different nuclear weapons, including one of the warheads deployed on the Trident D-5 submarine-launched ballistic missile, shown above (U.S. Navy photo).*

The U.S. Defense Department's Nuclear Posture Review -- a broad assessment of strategy, forces and readiness -- could highlight the initiative as a potential collaborative and cost-saving measure, according to insiders. The major review is expected on Capitol Hill by March 1 (see *GSN*, Jan. 6).

A fuse is widely regarded as a critical feature on a nuclear weapon because it controls whether and when the warhead detonates, and that can affect how much damage is inflicted.

Under the new initiative, a single fuse could potentially replace three different devices in the U.S. and British nuclear arsenals.

One fuse that could be replaced is used on 350 W-78 warheads, which the U.S. Air Force deploys on its Minuteman ICBMs. Another fuse is used on roughly 400 W-88 warheads fielded atop U.S. Navy Trident D-5 submarine-launched ballistic missiles. The third fuse to possibly be replaced is found on fewer than 160 warheads that the United Kingdom deploys on its own Trident missiles, according to defense officials.

"The [Minuteman ICBM] fuse was built in the '70s, so that's 40 years ago," said a Pentagon official who asked not to be identified, pending administration policy and budget decisions on the matter. "They were never designed for 30- or 40-year lifetimes at all in mind. So we need to replace them, we really do."

The current version of the Minuteman W-78 warhead fuse was fielded in 1979, while the fuse for the Trident W-88 warhead was first deployed in 1990, according to data compiled by nuclear-weapon experts Robert Norris and Hans Kristensen.

Program proponents say aging potentially increases the risk that these fuses could malfunction or even fail to detonate a nuclear weapon. Though atomic arms might never be launched, ensuring that they remain effective bolsters strategic deterrence, defense officials say.

"Joint" projects can be politically popular as a means of streamlining production and maintenance costs. However, critics are already lining up to question the wisdom of undertaking such an approach to the nuclear devices.

Some worry that designing a new fuse to replace old ones could add new military capabilities to the weapons, potentially stoking international tensions at a time when U.S. President Barack Obama has committed the nation to working toward the global elimination of nuclear arms.

In addition, several observers speculate that a common fuse design would require an enormous research-and-development investment just to bridge the differences between operating systems on the Air Force, Navy and British warheads. A more economical option might be to simply repair, update or replace each of the aging fuses separately, critics say.

Defense experts estimate that the cost of a common fuse -- mostly in terms of research and development -- would top $1 billion.

The Sandia National Laboratory in New Mexico last month launched a feasibility study aimed at determining what it would take to design and manufacture a common fuse. The assessment is expected to be done by October.

"We're not ready to say it's a joint program. We're doing the study to see if we can," the Pentagon official said. "At the end of that study, we'll make a decision [about] whether or not it warrants going through a joint development program, or if there's just not enough synergy, maybe we'll just share technology."

Initial funds to develop a common fuse could appear in Obama's fiscal 2011 budget request, which is to be finalized this week and delivered to Congress in early February, according to administration-watchers. The process of designing, developing and fielding a new fuse could extend over a decade, the Pentagon official said.

"This'll probably be a 10-year effort," the official told *Global Security Newswire*. "You've got to develop it, you've got to test it, you've got to flight-test it. And so this is not, 'New fuse,' snap your fingers real quick. No."

If the Sandia-led study concludes that a common-fuse approach is warranted, the next step would be to formally vet the concept through a high-level Pentagon panel that reviews and approves military needs. The Joint Requirements Oversight Council is led by the vice chairman of the Joint Chiefs of Staff, Gen. James Cartwright -- a former combat commander for nuclear weapons -- and includes the vice chiefs of each military service.

Following that review process, the services would undertake an "analysis of alternatives" to determine how best to meet the particular military specifications they seek in the device.

A new fuse for the U.S. Navy's W-88 warhead is slated to be produced beginning in fiscal 2014 and installed beginning in fiscal 2018, according to Kristensen, who directs the Nuclear Information Project at the Federation of American Scientists. He said the target dates were included in a calendar prepared two years ago by the U.S. National Nuclear Security Administration, a semiautonomous arm of the Energy Department.

An NNSA schedule for the Air Force's W-78 warhead life-extension effort -- which Kristensen said is likely to include fuse replacement -- shows initial production in fiscal 2018 and installation beginning in fiscal 2023, the arms expert said.

It is too early to know whether the United Kingdom would help underwrite the cost of research and development, but London is participating in the Sandia study, the Pentagon official said.

This would be the second nuclear-warhead fuse procurement effort undertaken over the past few years by the British Atomic Weapons Establishment, which designs and maintains that nation's stockpile. Under the first effort, London has begun installing on its Trident warheads a U.S.-designed Mk-4A fuse that reportedly increased the weapon's accuracy and number of potential targets (see *GSN*, March 15, 2007).

That fuse was initially designed for the re-entry vehicle that carries the U.S. Navy's W-76 Trident warhead, a relatively small weapon believed to be similar to the warhead carried on the United Kingdom's submarine-launched missile fleet.

London's participation in the Sandia study, which could lead to a common fuse for significantly larger U.S. Navy and Air Force warheads -- the W-88 and W-78, respectively -- has some nuclear arms experts scratching their heads.

"I'm surprised if they have work on the way for a fuse for a W-88 size re-entry vehicle, because every indication so far has been that the Brits had a system that was closer to the W-76," the smaller U.S. Navy Trident warhead, Kristensen said in an interview this week.

Both of the U.S. warheads that would potentially receive the common fuse also pack a bigger punch -- 335 kilotons for the Air Force W-78 and 455 kilotons for the Navy W-88 -- than that attributed to W-76 or the British Trident warhead, which are believed to have an explosive yield of 100 kilotons.

The British government declined to say this week whether it might participate in a U.S. common fuse effort to complement its Mk-4A fuse procurement, or if instead the common fuse could fully replace the Mk-4A devices being installed on its Trident fleet. However, an official did note that the British interest in other fuse technologies might contribute toward future modernization.

"The U.K. does not currently have fuse plans for its current warhead design beyond the introduction of Mk-4A," said a British official, speaking on condition of not being named while discussing sensitive nuclear-weapon issues. "We continue to work on fuse technology as part of maintaining our nuclear weapon design and stewardship capabilities, which are an integral part of our ability to maintain our nuclear deterrent capability. Work on a range of technologies will also support eventual decisions on whether and how to replace the current warhead design."

Like Washington, London is grappling with how it will keep its nuclear arsenal viable in the coming years.

"The U.K. is committed to maintaining its nuclear deterrent," the official said. "Decisions on whether and how we may need to replace the current warhead design are likely to be necessary in the next Parliament."

A national election in the United Kingdom is due by June.

The British official declined to discuss possible collaboration on a common fuse, but did note that the Mk-4A effort remains ongoing.

"As a routine part of our warhead stockpile stewardship program, the U.K. is currently introducing the Mk-4A arming, fusing and firing system into the U.K. stockpile to overcome obsolescence and ensure the existing warhead can remain in service until the 2020s," the official said.

"The advantage of the new [Mk-4A] fuse is that it gives them much more flexibility in setting the warhead's height of burst, which in turn gives the planners more targeting options," Kristensen said. In other words, a warhead could be optimized for attacking particular types of targets -- such as buildings, missile silos or deeply buried command centers -- by setting its fuse to detonate at a particular altitude or on the ground.

Critics have complained that the Mk-4A upgrade made the United Kingdom's Trident warhead a more intimidating weapon, potentially capable of inflicting a disarming strike against smaller nuclear powers. That dynamic could tempt an adversary nation to launch its weapons rather than lose them.

The prospect of a fresh effort to build new U.S. and British fuses is renewing similar objections.

"My principal concern with any new fuse is that it could lead to new military capabilities because, if it can control burst height more accurately, then a weapon's hard-target kill capability can be enhanced," said James Acton, an associate in the Nuclear Policy Program at the Carnegie Endowment for International Peace.

As it stands, there should be no rush to replace the existing fuses on these warheads without fully examining options for repairing or refurbishing them, said one defense consultant who asked not to be named. There is no aging or maintenance crisis at this time forcing the United States to replace the fuses associated with its W-88 or W-78 warheads, this source said.

"A thorough requirements scrub could ... reduce costs and make [existing fuses] last longer," according to the consultant. "They're not worried about them not working."

Acton recommended a similar course.

"The labs regularly talk about the three options of refurbish, reuse and replace," he told *GSN*. "Before replacing, refurbishing and reusing should be seriously examined."

Kristensen said that if a common fuse effort can be shown to be cost-effective, the U.S. Congress might well support such an approach.

"I suspect that if they can save some money with a joint ... fuse and at the same time get a new fuse with more flexibility, then it will be a no-brainer for Congress," he said.

As anticipated arms control reductions shrink the size of the U.S. arsenal in the years to come, officials will probably seek wider targeting options for the few weapons that remain deployed, Kristensen said. Until the nation significantly curtails the missions for nuclear weapons -- a course that Kristensen advocates -- there will be pressure in Washington to procure new fuses with multiple features, he said.

Serious skepticism remains. A Pentagon inclination to replace existing fuses rather than maintain older systems might be driven more by parochial motivations than real cost savings, the defense consultant suggested. The two different approaches would likely come with widely divergent price tags, this source said.

"There are lots of officers out there that want to run a $1 billion program instead of a $50 million program," said the consultant.