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Nuclear Modernization, Enhanced Military Capabilities, and Strategic Stability

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Life-Extension Programs Can Add More Capabilities Than You Might Think

US Policy: Clear and Explicit Limits?

“We seek no new military capabilities in our nuclear forces.”

Admiral Cecil Haney, USSTRATCOM, March 2016

“The United States will not develop new nuclear warheads or pursue new military missions or new capabilities for nuclear weapons.”

Statement by President Barack Obama on the Release of Nuclear Posture Review, April 6, 2010.

This is actually three policies:

- 1) not develop new nuclear warheads
- 2) not pursue new military missions for nuclear weapons
- 3) not pursue new capabilities for nuclear weapons

The NPR formulation is slightly different and explicit about Life Extension Programs:

“The United States will not develop new nuclear warheads. Life Extension Programs (LEPs) will use only nuclear components based on previously tested designs, and will not support new military missions or provide for new military capabilities.”

Nuclear Posture Review Report, April 2010, p. xiv.

It might be unclear what is meant by “new military mission” or a “new military capability,” but current and planned nuclear weapons life-extension programs all appear to be adding new military capabilities to make the weapons more effective and more flexible.

B61-12: Enhanced Military Capabilities

“These life extension programs are not providing any new military capabilities... We’re not designing any new systems — new warheads, new nuclear bombs — with new military capabilities. What we are doing is just taking these old systems, replacing their parts...”

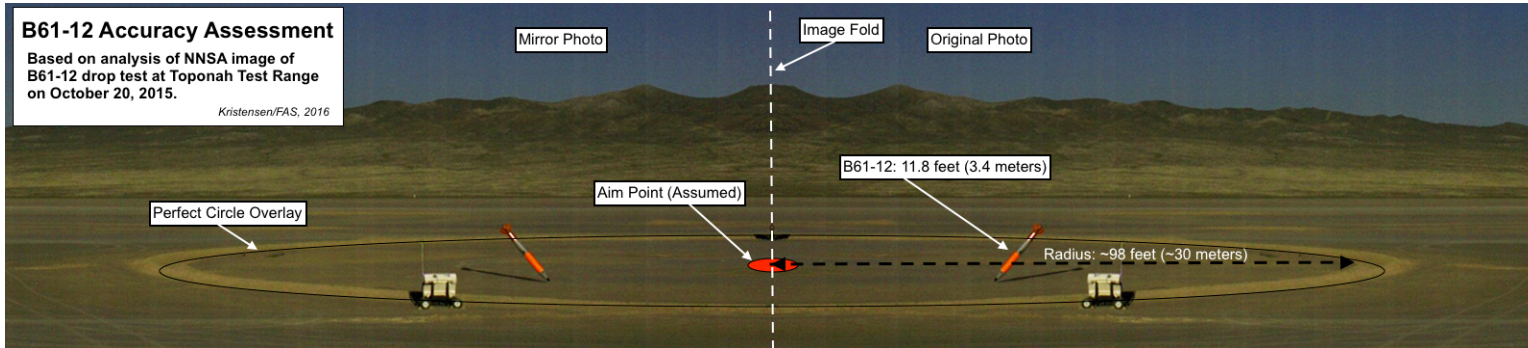
Madelyn Creedon, NNSA Principal Deputy Administrator, November 13, 2015

And yet...



B61-12 (top) and B61-7 (insert)

- B61-12 will be the **first guided nuclear bomb**. There are currently no guided nuclear gravity bombs in the US nuclear arsenal – A new nuclear bomb? A new military capability?
- B61-12 will have a new tail kit to provide **increased accuracy** that will allow strike planners to **select lower yields for missions that today require use of higher yields**, thus **reducing radioactive fallout** – A new military capability? A new military mission?
- B61-12 will have some **earth-penetrating capability** that can hold hard and deeply-buried targets at risk that today require very high-yield weapons (B61-7, B83-1), and do so from more aircraft – A new military capability?
- Instead of six different gravity bombs with different military capabilities deployed on different aircraft, the B61-12 will **merge all military capabilities into one type** that will be **deployed on all aircraft (B-2, B-21, F-15E, F-16, F-35A, PA-200)** – A new military capability? (Bold type indicates aircraft that can make use of increased accuracy provided by new tail kit)
- Instead of some gravity bombs (B61-7, B61-11, B83-1) being deployable by only one stealth aircraft (B-2), the B61-12 will be **deployable from three stealth aircraft (B-2, B-21, F-35A)** – A new military capability?
- Instead of tactical bombs deployed in Europe and strategic bombs deployed in CONUS, B61-12 **will merge tactical and strategic and bring strategic nuclear gravity bomb capabilities on stealth aircraft to Europe (F-35A) for the first time** – A new military capability?



Comparing bomb accuracy

Bomber gravity bomb drops in late-1990s had a goal of 550 ft (167 m) Circular Error Average (CEA) but often achieved a 380 (116 m) CEA for both high and low altitude releases, or an average of 364 (111 m) CEA in low-yield bombing.

B61-12: less than 98 ft (<30 meter) CEA demonstrated in a fully guided drop test from an F-15E on October 20, 2015.

The B61-12 appears to be 3-4 times more accurate than existing nuclear gravity bombs.

“...we are trying to pursue weapons that actually are reducing in yield because we’re concerned about maintaining weapons that would have less collateral effect if the President ever had to use them.”

Gen. Robert Kehler, Commander, STRATCOM, October 2013

Does the relatively low yield and increased accuracy of the B61-12 change the way the military thinks about how to use the weapon?

“Without a doubt. Improved accuracy and lower yield is a desired military capability.”

Would it result in a different target set or just make the weapon better?

“It would have both effects.”

Answers by Gen. Norton Schwartz, January 2014

“If I can drive down the yield, drive down, therefore, the likelihood of fallout, et cetera, does that make it more usable in the eyes of some — some president or national security decision-making process? And the answer is, **it likely could be more usable.**”

Gen. James Cartwright, former STRATCOM commander, November 2015

The B61-12 also appears to have earth-penetration capability in soil. If detonated underground, enhanced ground-shock coupling would give the B61-12 a capability against underground targets similar to a 1 MT surface burst. DOD says B61-12 allows retirement of the 1,2 MT B83-1.

“The yield required of a nuclear weapon to destroy a hard and deeply buried target is reduced by a factor of 15 to 25 by enhanced ground-shock coupling if the weapon is detonated a few meters below the surface.

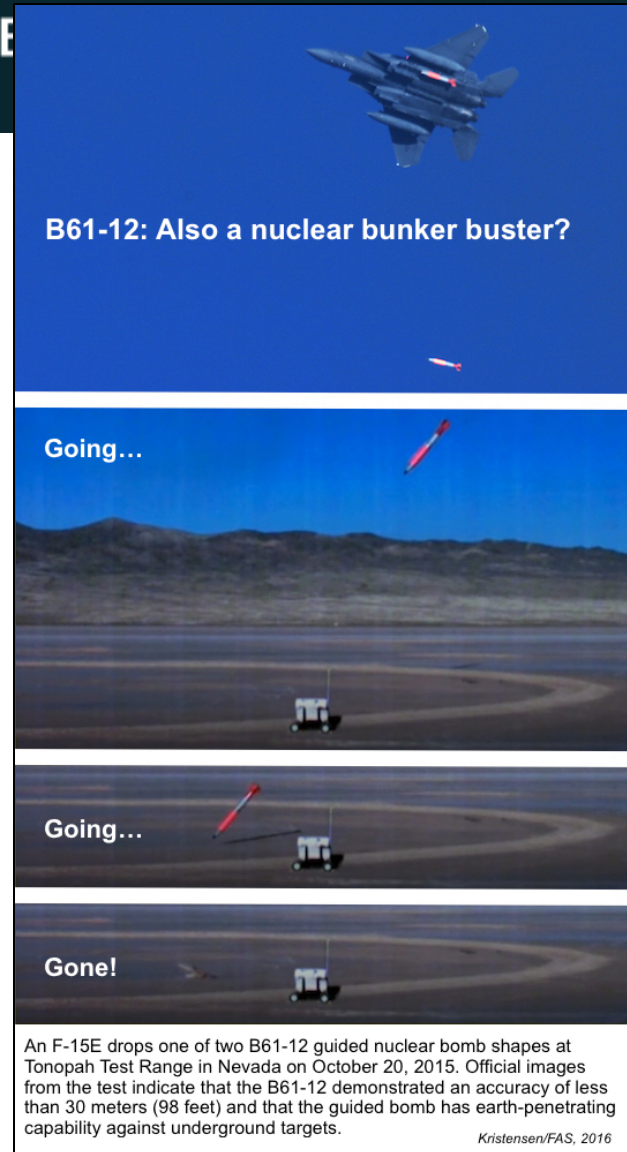
Nuclear earth-penetrator weapons (EPWs) with a depth of penetration of 3 meters capture most of the advantage associated with the coupling of ground shock.”

National Academy of Sciences, 2005

Earth-Penetration Effect On B61-12 Bomb Capability

Yield Option	Yield Equivalent With Enhanced Ground-Shock Coupling	Compatible Existing Warheads Being Retired
0.3 kt	4.5 kt - 7.5 kt	B61-3, B61-4, B61-10
1.5 kt	22.5 kt – 37.5 kt	B61-4, B61-10
10 kt	150 kt – 250 kt	B61-3, B61-7
50 kt	750 kt – 1,250 kt	B83-1
400 kt (B61-11)	6,000 kt – 10,000 kt	B53 (retired)

Note: STRATCOM required a B61-12 yield modification. It is unknown which one.



LRSO: Enhanced Military Capabilities

A variety of sources indicate that LRSO will have enhanced and new military capabilities compared with the existing ALCM.

Not only will LRSO be more capable, but it will be carried on bombers that are more capable than the current ALCM carrier (B-52).

More bombers will carry LRSO in the future than today. And they might be capable of carrying more missiles, which are not limited by New START

DOD plans to buy nearly twice as many LRSOs as there are ALCMs today.

Officials describe the LRSO mission as a tactical nuclear weapon intended for use early in a conflict as part of escalation scenarios.

The LRSO will be carried by both B-2 and B-21 stealth bombers. No stealth aircraft is equipped with nuclear cruise missiles today.



ALCM Versus LRSO Capabilities

	ALCM	LRSO
Missiles	575	1,000-1,100
Range	2,500 km	> 2,500 km
Stealth	Little	Yes
Speed	550 mph	+5%, +15-20+, supersonic
Warhead	W80-1	W80-4
Yield	5-150 kt ^a	5-150 kt ^b
Number	528	528
Aircraft	B-52H (44)	B-2, B-21, (B-52)
Number	44	19, 41 = 60
Stealth	No	Yes
Loading	x 20	x 16, x 16, (x 20)
Max Capacity	880	304, 656, (820) = 960 (1,124)

^a W80-1 is officially 150 kt with lower selectable yields.

^b W80-4 will have same maximum yield but might get improved yield selection options to emphasize use of lower-yield options in a strike.



W76 LEP: New Military Capabilities

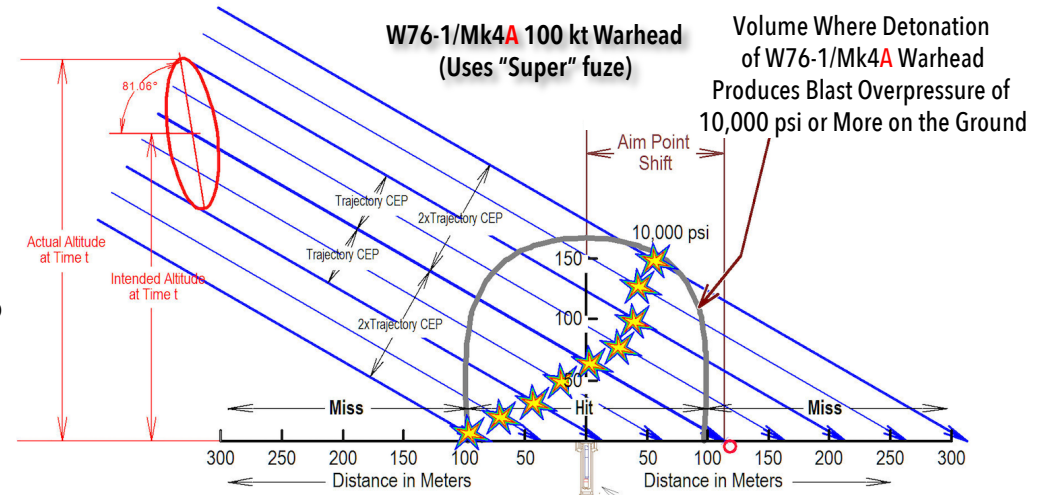
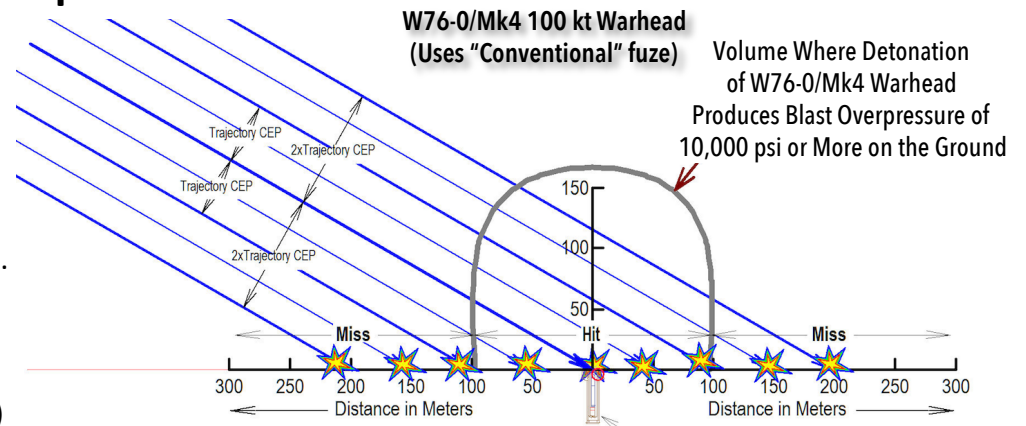
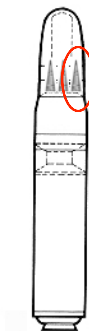
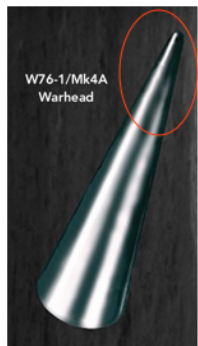
W76 life-extension program to extend service of warhead for another 30 years.

W76-1 officially not a new weapon and has no new military capabilities.

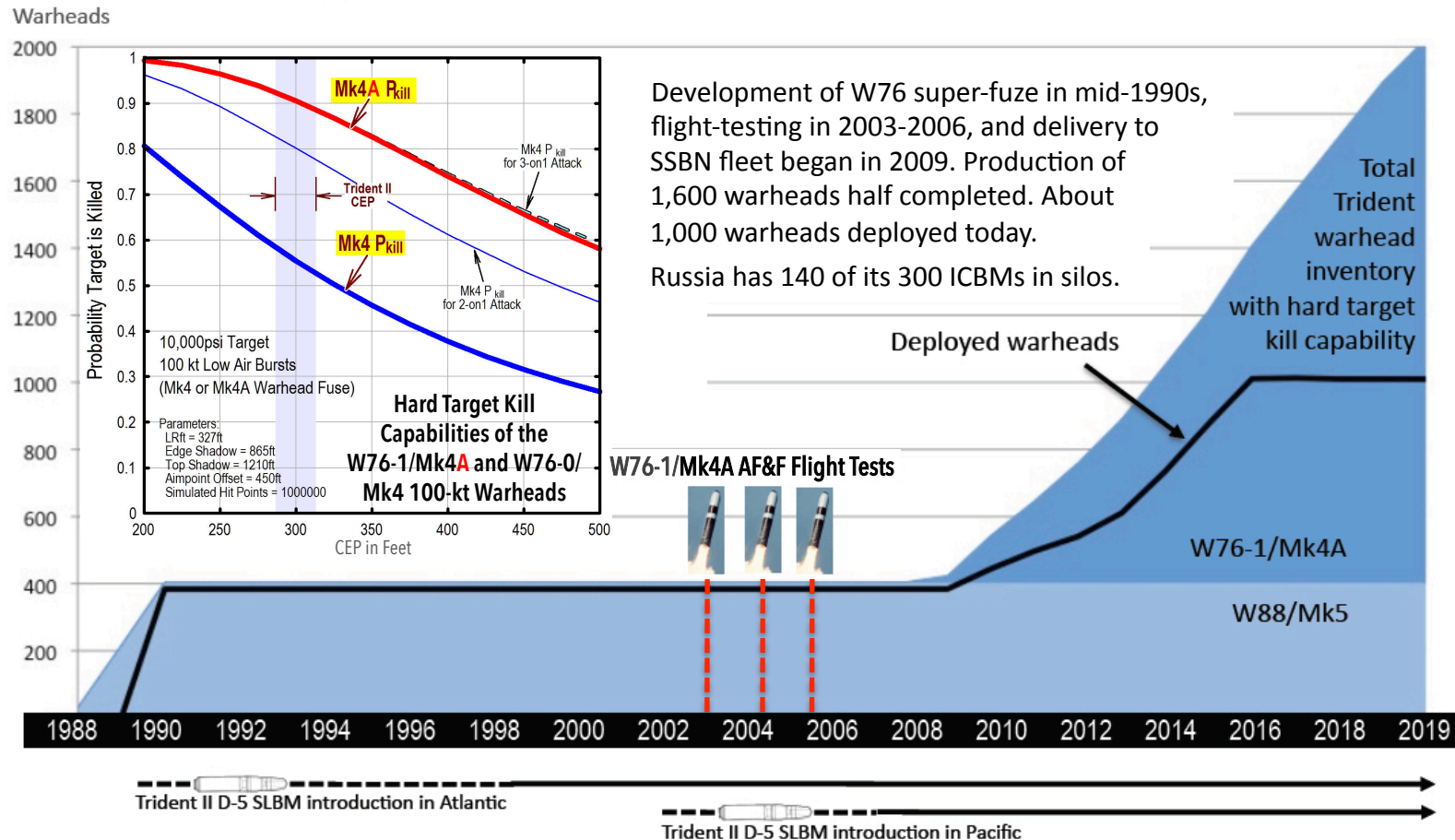
But new radar-updated, path-length compensation fuze (MC4700 Arming, Fuzing & Firing (AF&F) unit) enables warhead to adjust height of burst to compensate for re-entry inaccuracy.

The "super" fuze significantly enhances the warhead's capability to destroyed hardened targets.

A similar capability is being added to the Minuteman III ICBM.



Hard Target Kill Warheads on Ohio-Class Missile Submarines



Conclusions and Implications For Strategic Stability

Despite US policy not to add new military capabilities to nuclear weapons during life-extension programs, all life-extension programs appear to do so anyway.

The new hard-target capability of the W76-1/Mk4A significantly increases the capability against Russian and Chinese hard and deeply buried targets.

Unlike during the Cold War, most US hard target kill capability is now on SSBNs that can put more warheads on target faster than ICBMs.

Pursuit of increased accuracy, enhanced hard target kill capability, stealthy cruise missiles and bombers, lower-yield options to reduce radioactive fallout, and more widely distribution of enhanced flexible strike options on aircraft, show a nuclear posture that appears to look beyond basic deterrence in pursuit of warfighting and supremacy.

This, combined with Russia's and China's lack of effective space-based early-warning systems, undermines strategic stability and contradicts US policy to maintain it.

“...are we doing the right things to encourage strategic stability?”
Admiral Cecil Haney, Commander, STRATCOM, July 29, 2015

“The United States seeks to maintain strategic stability with Russia. Consistent with the objective of maintaining an effective deterrent posture, the United States seeks to improve strategic stability by demonstrating that it is not our intent to negate Russia's strategic nuclear deterrent, or to destabilize the strategic military relationship with Russia.”
DOD, Nuclear Employment Strategy Report, June 2013, p. 3.

“Stability in the nuclear relationship between the United States and the Russian Federation depends upon the assured capability of each side to deliver a sufficient number of nuclear warheads to inflict unacceptable damage on the other side, even with an opponent attempting a disarming first strike.”
DOD/DNI. Report to Congress on Russian Strategic Forces, 2012, p. 5.