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B61 Mod 12 LEP

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As I mentioned a couple of days ago, Elaine Grossman had an excellent story on the B61 Mod 12 LEP. Elaine reported that NNSA was considering either increasing the size of the B61 or reducing the explosive yield to create "real estate" for new new safety and security features:

> 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.

I've now been told that NNSA is considering precisely those two options: either to build a device that would require a physically larger casing or reducing the yield.

The policy question is whether Congress ought to view reducing yield as a "new" weapon that does not conform to the military characteristics of the existing stockpile. On the one hand, reducing yield would *ceteris paribus* reduce capability. But other things are seldom equal. The B61 Mod 12 will likely have all sorts of new components outside of the nuclear explosives package (fuses, spin rocket motors and the like) that will more than offset any loss in yield.

As yield declines, NNSA opens the US up to claims that it is pursuing "mini-nukes" and other "more usable" nuclear weapons that would lower the threshold for nuclear war. That's a concern in this case because the lowest yield setting of the *existing* B61 tactical variants is in sub-kiloton territory. The B61 is said to have a variable yield between .3 kt (300 tons, most likely the yield of the unboosted fission primary) and a few hundred kilotons.

One option is, presumably, to re-use the W84 pits that are sitting in the strategic reserve and have a mechanical safing device. (Both the W84 and W85 were derived from the B61 3/4 and the B61 Mod 10 was made, in turn, from reused W85 pits.) The W84 has a minimum yield of 200 tons (.2 kt).

Mod	Entered Stockpile	Comment
0	1969	No command or enhanced electrical safety, strategic bomb all converted to Mods 6 and 9 by October 1992
1	1971	Strategic bomb; replaced MK 28; all converted to Mod 7 by Oct 1992
2	1975	Inertial command disable; tactical bomb; 10-345 KT yield; no IHE; converted to Mod 8
3	1979	In stockpile, includes IHE, command disable, weak link/strong link signal generator; tactical bomb replacing MKs 28, 43, 57

4	1979	Same as Mod 3
5	1977	Nonviolent command command disable, weak link/strong link signal generator; tactical bomb replacing MKs 28, 57; 10-345 KT yield; no IHE; all converted to Mod 8 by June 1993
6	canceled	Upgraded B61-0; new PAL and IHE; IOC was to have been March 1991; included ENDS; cancelled Feb 1992
7	1985	Modified B61-1, in stockpile. Includes new PAL, IHE, backup fuzing, command disablement. High yield strategic SAC bomb replaced MK 28FI. Some Mod 7s were converted to EPWs.
8	canceled	Upgraded Mod 0; IOC was March 1991; included IHE, ENDS; canceled Feb 1992
9	canceled	Tactical bomb; Mod 0 conversion; included IHE and ENDS; canceled September 1991
10	1990	Yield between those of Mods 3 and 4 (0.3-80 KT); modified W-85 warhead in B61-4; in stockpile. uses IHE and ENDS
11	1996	EPW with a single yield in the hundreds of kilotons

Source: Comments, with the exception of the B61-11 are from Chuck Hansen, *Swords of Armageddon*, vol VI, Table 4-27. I am not 100 percent on the stockpile entry dates, but they should be within a year or so.

It would seem to me that there is no inherent problem with the idea of reducing yield, provided that the rationale is to create "real estate" for new security or reliability measures. In fact, that was precisely an exception outlined in the final Spratt-Furse language that prohibited the research and development of mini-nukes from 1994-2004:

> Nothing in this section shall prohibit the Secretary of Energy from conducting, or providing for the conduct of, research and development necessary … (2) to modify an existing weapon for the purpose of addressing safety and reliability concerns …

It would seem to me that if Congress wanted to LEP the B61 at a reduced yield, while protecting our nonproliferation interests, they could fund the B61 Mod 12 LEP *and* reinstate Spratt-Furse.

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Comment

1. I think it is a kind of important point what the unboosted yield is from the standpoint of redesigns.

   I suggest that 0.3 kilotons is actually the unboosted AND PREINITIATED yield. It stands to reason that if you have electronic initiation and you want to build the lowest yield possible, this would be the choice.

   Why is this important?
   At 0.3 kt, the primary temperature will only rise into the range of 4-5 keV which is right on the edge of being able to generate sufficient fusion rate to ignite the boost – check out the fusion rates yourself. On the other hand, by the time you reach about 2 kt, the temperature has risen to about 8-9 keV and radiation losses clamp the temperature strongly. Therefore, there are no additional returns to increased yield past this point – from the standpoint of igniting the boost.

   Therefore, I am suggesting that IF the unboosted yield were only 0.3 kt, we need to take seriously the government claim that the weapons are really designed right on the edge and there is design risk. Personally, I do not take that claim very seriously, and I think that a 1-2 kt would be a better choice for an unboosted yield with correctly timed initiation.

   So, I guess the question you have to ask yourself when you're staring at a bomb that can blow your city clear off the map, is do you feel lucky? Well, do you…?

   — John Field · Oct 13, 02:40 PM ·

2. in case they decrease the yield of the B61, will the expected decrease differ from the current one by 10% or more? If not, it would be likely within errors of any test used to certify the yield, and the question would appear to be somewhat moot. (Of course, I'm not suggesting a test — just that we don't know these yields better than to 10% as far as I'm aware — I may be wrong).

   — yousaf · Oct 13, 04:19 PM ·