

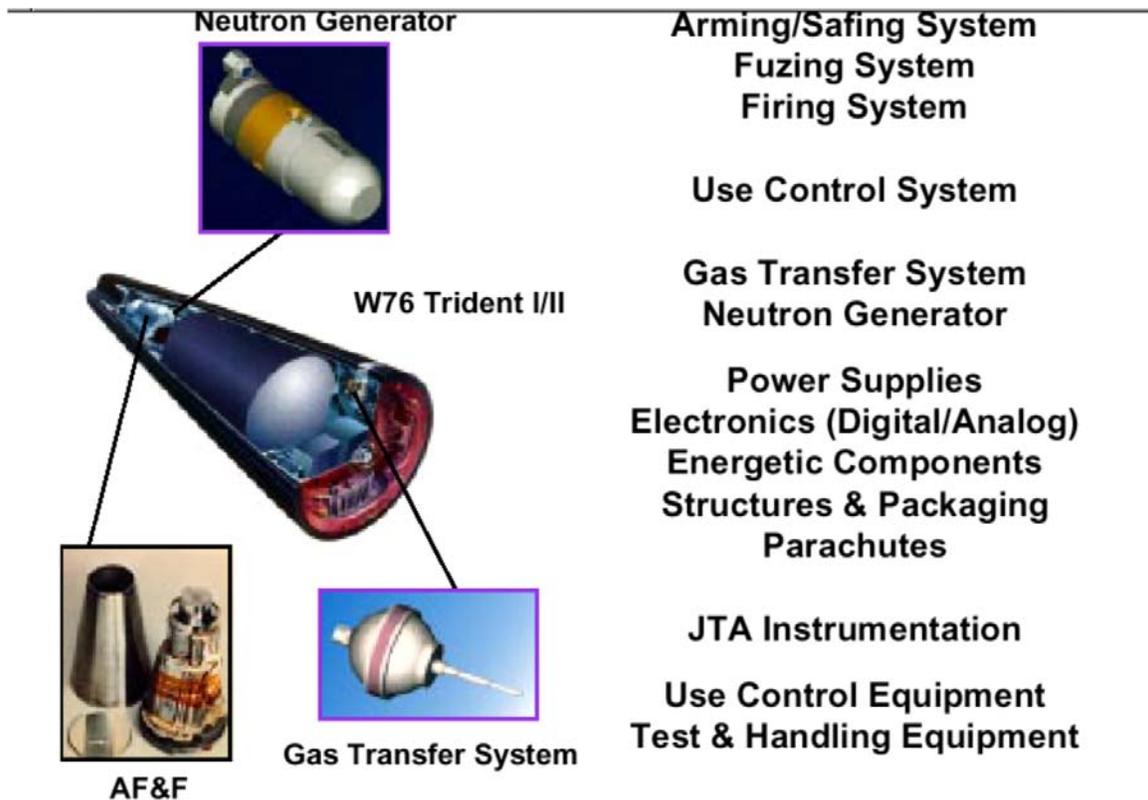
# US Life Extension Programs = US Taxpayer Ripoff?

Ara Barsamian  
Nuclear Non-Proliferation Institute  
Morristown, NJ USA  
ara.barsamian@nuclearnonproliferation.org

## Introduction and Summary

The US is undertaking Life Extension Programs (LEP) to add roughly 30 additional years to the existing nuclear weapons stockpile. These programs typically cost the US taxpayers billions of dollars, estimated at \$26 to billions between 2011 and 2020. As currently planned, this costs will reoccur roughly every 30 years at the end of life of each LEP cycle, or 50 to 100 billion for the rest of the 21st century, independent of the New START reductions. These costs can be easily cut by more than half by reusing the existing, most modern and safe warhead, the W87, as a building block for all the proposed LEPs for B61 and W78.

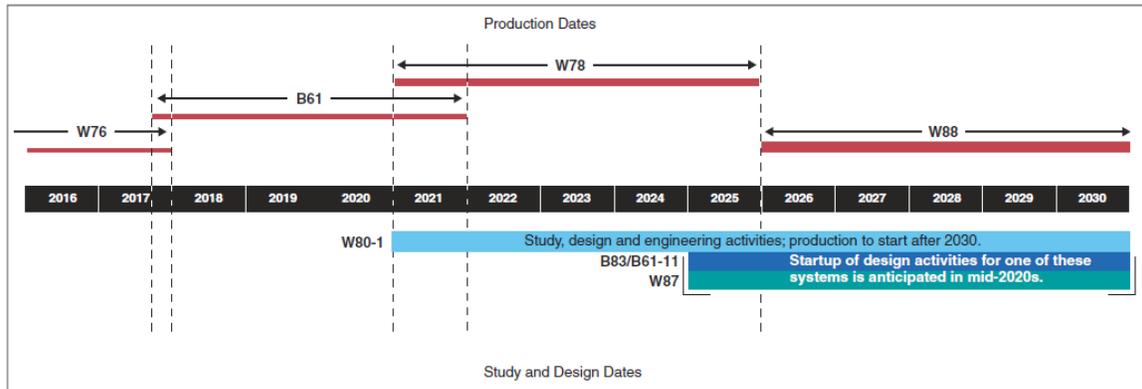
LEP becomes necessary when using Plutonium, which gives off heat and alpha particles which age materials and contributes to their decomposition and property changes. Things like high explosives, binders and adhesives, and plastics also give off gases. The heat and gases contribute to promoting corrosion of the pit and detonators, electronics circuit boards, and accelerated decomposition, brittleness and cracks in high explosives; the result is lowers warhead reliability. An example of LEP for the W76 is shown below.



Credit: SANDIA

The LEP programs are justified for some of the weapons in the so-called enduring stockpile, the ones that have reasonable robust, reliable, and safe design and military characteristics. These include the refurbished versions of W76 and W88 (Trident), W87 (Minutemen), W80 (cruise missiles), and B83 (strategic bomb).

The US DOE NNSA LEP plans<sup>1</sup> are shown below. The planned LEPs cover the W76, B61, W78, and W88. The schedule stretches to 2030, and then the whole process repeats itself for the previous warheads, e.g. W87, and then every 30 years or so..



Source: NNSA.

There are rough cost estimates, but actual budget numbers will depend on finishing the detailed feasibility studies (so-called Phase 6.2). To give you an idea of the costs, the rough numbers are:

- W87                   \$0.75 billion (recently refurbished); cost overrun of ~70%
- W76-1               \$4 billion (cost overruns due to BeO interstage production)
- B61-12              \$4 billion + \$2 billion for 2nd LEP in 2025
- W78                   \$5 billion

Total Estimate ~ \$16 billion to 2025

Assuming the LEP cycle will occur every 30 years, we are talking about blowing more than \$50 to \$100 billion of taxpayers money in difficult economic conditions for the US.

To this \$16 billion one needs to add the new factories that will make the Plutonium pits (CMRR) at Los Alamos (originally \$0.5 billion, now \$5 billion and counting), and fusion capsules (CSA's) at Y-12 (UPF) at Oak Ridge (originally \$1.5 billion, now \$6.5 billion and counting). Unfortunately, these \$11 billion factories will not be available in time for the planned LEPs (will be done without them!). Stopping the work can save half of the cost.

There are cheaper alternatives with zero risk at a fraction of the cost of LEP's for B61 and W78, namely, fitting the existing "physics package" of W87, or W88 or W76 in the B61 bomb casing, and wholesale replacement of W78 with W87 warhead (with W88 as a backup to W87).

Long range, replacing Plutonium pits with Uranium pits reduces/eliminates LEP's while also eliminating the nocive effects of Plutonium both on humans and warheads.

## The B61 LEP<sup>2</sup>

The objective is to reduce 4 B61 variants (B61-3, B61-4, B61-7, B61-10, with yields varying between 0.3 kt to 170kt) to one multipurpose bomb (B61-12) to be used by NATO. The proposed basis will be the B61-4 with a max yield of 50kt but with a much more accurate GPS guidance with CEP error of 5 meters, providing increased lethality with lower yield.

The LEP includes replacing the existing warheads with either refurbished or brand new components, from Plutonium pits, canned subassemblies, radiation case, gas transfer system, neutron generator, cabling, detonators, insensitive high explosives, safety and security interlocks, guidance system, radar, etc.



The cheapest solution would be to use the recently LEP'd W87 fitted into a B61 case. The W87 uses a fire resistant pit to minimize dispersion of Plutonium in a fire, insensitive high explosive which minimizes the risk of accidental explosion and scattering of Plutonium in the pit like at Palomares, Spain. The W87 yields can be set externally to the radiation case, e.g. firing the unboosted primary (0.3 kt), boosted at 2 different Tritium levels (5 and 10kt), and boosting at the third Tritium level a get partial ignition of the secondary to limit the yield to 50-70kt.

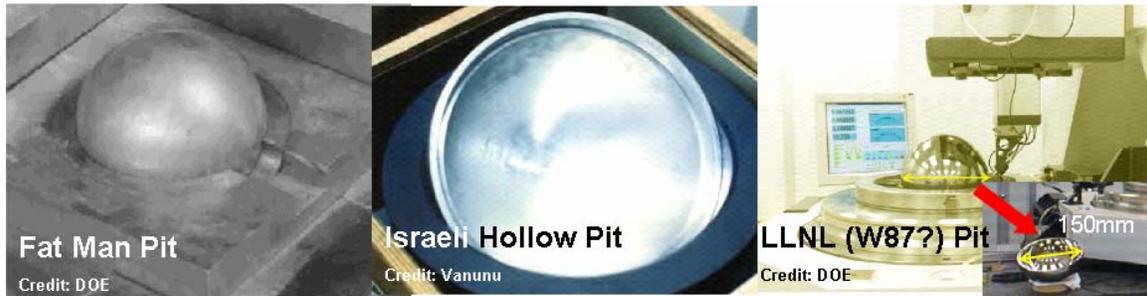
## The W78 LEP

The W78 is a 335 kt obsolete warhead loaded on Minuteman III, with incipient signs of deterioration, e.g. pit corrosion.

An illustration of different pit "generations" and propensity for corrosion is shown below.

The first pit is a Fat Man solid Pu pit (the one that killed Daghlian in '45 and Slotin in '46). It has a relatively coarse surface and nickel-plated, with potentially trapped electroplating liquid forming blisters/irregular surface. The second generation "hollow pit" has a nickel-plated Pu hollow pit surrounded by an ordinary U-238 reflector/tamper. Again you can see irregularities on the inner surface that can promote corrosion and also

increase the susceptibility of the core to Rayleigh-Taylor instability (poor performance). This type of pit is suspected of being similar to the one used in the W78. The third pit is a modern Pu pit from LLNL with mirror finish to minimize R-T instabilities, and also "flashed" with gold to delay corrosion. In addition, it uses significantly less Plutonium than the first 2 generation, and thus, less heat to promote corrosion. This pit will last a century or more...



The proposed LEP work includes a complete remanufacturing of all the components, both inside and outside the radiation case, which is a complete waste of money on an obsolete warhead.

The military thinking re W78 LEP is that it easy to re-MIRV the Minuteman III if the future situation demands (although the current NPR contingency is uploading the SLBM rather than Minuteman III), which cannot be done with a different warhead like W87 without extensive redesign and testing of the MIRV "bus" platform to handle 3 W87's (no problem with 1 W87).

On the other hand, the 300kt W87 more than compensates for the slightly lower yield (300 vs. 335kt) with a new AFAF recently retrofitted already on LEP-ed W76, with a much smaller CEP (aim accuracy).

Scrapping the W78 and replacing it with W87 provides a modern, safe, reliable, proven warhead while also "shaving about \$4 or more billions of wasted taxpayer money.

## **Future of LEP**

Currently, US is building two very expensive facilities:

1. Chemistry and Metallurgy Research Replacement (CMRR) facility at Los Alamos. The purpose of the facility is to manufacture Plutonium pits. Considering that the US has over 10,000 pits in storage at Pantex, that using Plutonium contributes directly to lowered weapon reliability and the need for LEP in the first place, the expenditure of about \$6 billion of taxpayer funds in an economic depression climate is absurd.
2. Uranium Production Facility (UPF) at Y-12 complex in Oak Ridge. The purpose of the facility is to provide the components and assembly of the fusion capsule,

the canned sub-assembly, consisting of enriched, normal, or depleted Uranium, and Lithium Deuteride of various enrichments. It also provides radiation cases using Uranium, and other materials, such as channel fillers. Again, considering that there are thousands of CSA's in storage, the elaborate \$6 billion and counting facility (not completed yet) needs to be re-examined.

Finally, the US government should seriously consider going to an all-Uranium warhead to eliminate the problems and costs associated with Plutonium and LEP programs. With Uranium, negligible alpha decay, no heating, not poisonous like Plutonium equals no more LEP's for a century, or worries about Plutonium contamination and poisoning. The existing Y12 facilities are more than adequate to support an all-Uranium warhead. And for those that argue that we need a "proof-test", it is useful to remember that all the fission and thermonuclear warhead/bomb designs worked the first time around!

#### References

[1] US DOE NNSA "FY2011 Stockpile Stewardship and Management Plan Summary", May 2010

[2] US GAO "NUCLEAR WEAPONS: DOD and NNSA Need to Better Manage Scope of Future Refurbishments and Risks to Maintaining U.S. Commitments to NATO", Report GAO-11-387 May 2011