nuclear watch new mexico

Oldest U.S. Nuclear Weapons in Planned Stockpile Are Seven Decades Younger than Expected Lifetimes

The age of nuclear weapons in the U.S. stockpile has been inconsistently reported. The National Nuclear Security Administration (NNSA), the semi-autonomous nuclear weapons agency within the Department of Energy, has emphasized that it maintains weapons that are 30 years or older. For example, the Lawrence Livermore National Laboratory (one of the three nuclear weapons design labs) declared in 2002, "stewardship is a race against time. The oldest nuclear weapon in the stockpile was added to the stockpile in 1970. That makes the weapon 30 years old." [1] More ominously, while announcing the need for a super bomb plant, NNSA said, "We know that plutonium pits have a limited lifetime." Without replacing the bombs, "we could wake up and find out half our stockpile gone to waste." [2]

NNSA uses the potential effects of aging on nuclear weapons components as substantial justification for controversial programs, such as the Reliable Replacement Warhead[3] and "Complex 2030,"[4] as the agency seeks to restore design and production capabilities comparable to those of the Cold War.[5] Nuclear weapons ages can be indisputably determined from a 1995 tri-lab study which gives the year for each "First Production Unit" and the length in years of their production runs.[6] Nuclear Watch New Mexico believes these ages will be of increasing significance when contrasted against recent conclusions that the lifetimes of plutonium pits, the core component or "triggers" of nuclear weapons, are double NNSA's previously accepted 45-60 year estimate.

The plutonium pit is the crucial nuclear weapons component; thus the significance of any impact of aging on its performance and reliability cannot be over-emphasized. NNSA has been conducting "accelerated plutonium aging studies"[7] for at least a decade. Given that 100's of billions of dollars and the course of future U.S. nuclear weapons policies could ride on the results, we thought it prudent there should be independent peer review.

Accordingly, Nuclear Watch New Mexico requested Senator Jeff Bingaman (D.-NM) to introduce legislation that required independent review by a qualified federal contractor with the necessary security clearances. He successfully did so as an amendment to the Fiscal Year 2004 Defense Authorization Act, and ultimately JASON was contracted to conduct that review. JASON is a group of eminent scientists, among whom have been Nobel laureates and original Manhattan Project scientists, who act as consultants to the government. The results of their review were recently released, with its key finding:

> "Most primary types [pits surrounded by high explosives] have credible minimum lifetimes in excess of 100 years as regards aging of plutonium; those with assessed minimum lifetimes of 100 years or less have clear mitigation paths that are proposed and/or being implemented." [8]

The thousands of nonnuclear components in a weapon, such as arming and fuzing devices, electromechanical switches, etc., can be rigorously tested. The "Complex 2030" supplemental environmental impact statement (EIS) now under debate is "tiered" off a 1996 programmatic EIS. The earlier PEIS declared, "high confidence in the safety and reliability of nonnuclear components and subsystems can be established" through manufacturing data and ongoing lab tests and flight tests involving complete but unarmed nuclear weapons.[9]

The conventional high explosives used to initiate the nuclear explosion in plutonium pits have been shown to grow more stable with age in some of their key characteristics,[10] and these same high explosives of similar age

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can be tested outside of the nuclear weapons. In contrast, plutonium pits cannot be full-scale tested because that would result in a nuclear explosion, currently banned under an international testing moratorium. Therefore, the significance of predicted plutonium pit performance lifetimes cannot be overstated when it comes to nuclear weapons reliability.

Plutonium pit aging is now clearly less of an urgent concern than previously thought. As Rep. David Hobson, R-Ohio, chairman of the House Subcommittee on Water and Energy Appropriations, which oversees annual spending on nuclear weapons work, said, "This shows we can take a breather for a while." [11] There is time to ask basic questions. Does this country really need to design and build new weapons and the NNSA-proposed industrial-scale plutonium pit production facility—both vastly expensive enterprises likely to suffer from cost overruns and the hidden costs of cleanup and environmental remediation?

We calculate below that the average age of nuclear weapons in the planned "enduring stockpile" is currently less than 21 years old, with the oldest weapons still just 28 years old. Moreover, because the 2002 "Moscow Treaty" mandates the reduction of the U.S. operational stockpile to 2,200 weapons or fewer by 2013, weapons older than the average age could and should be retired and dismantled. Therefore, the average age of U.S. nuclear weapons could become the oldest age, were there a national policy to that effect.[12] In that case, the oldest U.S. nuclear weapons would have approximately three-quarters of a century before their expected end-of-life, if necessary to retire them at all. By 1993 no U.S. nuclear weapon had ever been retired because of age, out of a stockpile going back to the early 1950's. A "Stockpile Life Study" by the Sandia National Labs concluded, "although nuclear weapons age, they do not wear out; they last as long as the nuclear weapons community (DoD and DOE) desires. In fact, we can find no example of a nuclear weapon retirement where age was ever a factor in the retirement decision."[13]

Below are the ages of individual nuclear weapons types and the length of their production runs from the tri-lab study. We have added the current estimated numbers of nuclear weapons, their projected numbers in 2013, and the average age today of both those in the existing stockpile and those slated to remain in 2013. These future reductions are perhaps reasonable to expect. The NNSA itself states it must justify that it is not restarting a nuclear arms race by designing new weapons for the Reliable Replacement Warhead Program.[14]

Weapon Type [15]	Age of FPU	Age of Last Unit	Average Age	2006 Numbers [16]	2013 Numbers [17]
B61-3, 4	27	15	21	790	400
B61-7*	21	15	18	480	465
B61-10	16	14	15	206	180
W62	36	29	32.5	580	0
W76	28	18	23	3030	1840
W78	27	23	25	805	400
W80-0, 1	25	15	20	2105	1090
B83-0, 1	23	15	19	626	625
W84	23	17	20	383	0
W87	20	16	18	553	545
W88	18	15	16.5	404	400
				9962	5945
Average age of all U.S. nuclear weapons				21.6 years / 20.5 years	

Stockpile Surveillance: Past and Future *September 1995*

Table II. Year of First Production Unit (FPU) and length of production for each weapon type in the planned stockpile.

Weapon Type	*FPU Year*	*Length of Production*
B61-3	1979	12 years
B61-4	1979	12 years
B61-7*	1985	6 years
B61-10	1990*	2 years
W62	1970	7 years
W76	1978	10 years
W78	1979	4 years
W80-0,1	1981**	10 years
B83-0,1	1983***	8 years
W84	1983	6 years
W87	1986	4 years
W88	1988	3 years

* Likely includes the B61-11 earth-penetrator modified from the B61-7, deployed in 1997.

As shown, the oldest type of nuclear weapon in the active U.S. stockpile is the W62, an intercontinental ballistic missile warhead. The W62's First Production Unit (FPU) is now 36 years old. However, the Bush Administration's 2002 Nuclear Posture Review (NPR) explicitly stated, "the W62 will be retired by the end of FY 2009."[18] The next oldest nuclear weapon is the submarine-launched W76, whose FPU is 28 years old. Naturally, "units" other than FPUs are younger.

In addition, the W87 has undergone, and the B61, W76 and W80 will undergo, "Life Extension Programs" in which they are extensively refurbished, and hence are arguably still "younger." The exception is that the key components, the plutonium pits or "triggers," are not refurbished or remanufactured. However, the JASON report now assures us that pits last a century or more.

With established nuclear weapons ages, future retirements, and pit performance lifetimes of 100 years, new-design nuclear weapons and a new industrial-scale plutonium pit production facility are simply not needed. More importantly, to continue with them could actually harm our national security because the NNSA plans to begin soon the replacement, by 2030, of the entire and already extensively tested U.S. stockpile with so-called Reliable Replacement Warheads. Our national security would be compromised should our example encourage other countries to design new weapons and produce both new and existing nuclear weapons, while we replace ours with untested weapons.

Both 2004 presidential candidates agreed that nuclear weapons proliferation is our gravest national security threat. Given that, isn't it foolhardy to spur by example other countries to undertake new designs and production when we don't need them to begin with? Isn't it added foolhardiness to spend 100's of billions of dollars on new, untested weapons and an expensively revamped nuclear weapons complex when they are not really needed? The prudent, conservative course of action would be to maintain stockpile reliability through a rigorous "Stockpile Evaluation Program," which the NNSA has so far failed to do,[19] and to remanufacture nuclear weapons components on a strict as-needed basis while rigorously adhering to proven original designs. More generally, the U.S. should radically downsize its existing nuclear weapons stockpile to the lowest levels really needed for post-Cold War deterrence (~200 nuclear warheads?), refrain from new designs and production, and thereby give an encouraging example to all countries in order to boost our own national security.

- Jay Coghlan

Endnotes

1. National Ignition Facility FAQs, LLNL, 2002, www.llnl.gov/nif/project/pdf/NIF_FAQs.pdf
2. NNSA spokesman Brian Wilkes, The Las Vegas Sun, September 27, 2002.
3. RRW is a program created by Congress in 2005, the purported purpose of which is to ensure the future reliability of the U.S. nuclear weapons stockpile. NNSA and the three nuclear weapons designs labs have seized upon the program as an opportunity to develop and produce future new designs. For more, please see http://www.ananuclear.org/dc_days06/RRW2006.pdf
4. Complex 2030 is the nuclear weapons complex of the future as proposed by NNSA (see the agency's 10/9/06 "Notice of Intent" at http://www.complex2030peis.com/NOI%20Oct%2019%2006.pdf). NNSA calls the Reliable Replacement Warhead the "enabler" for transformation of both the U.S. nuclear stockpile weapons and the complex that supports it. Concerning the key production mission, NNSA is proposing a "Consolidated Plutonium Center" at a site yet-to-be-determined, capable of producing at least 125 RRW pits per year. Given the age of U.S. nuclear weapons discussed here and plutonium pit lifetimes, we believe the rationales for both RRW and Complex 2030 are seriously undermined.
5. See April 5, 2006 testimony by Tom D'Agostino, NNSA Deputy Administrator for Defense Programs,

http://www.nnsa.doe.gov/testimony.htm. Among many other things, D'Agostino said "these timelines would restore us to a level of capability comparable to what we had during the Cold War." The timelines he testified to were the ability to fix any stockpile problems found within 12 months and the capability to produce new designs within 4 years. He further asserted that "even if [plutonium] pits lasted forever" a production level of 125 pits per year is needed for RRW, which is circular logic at best.

6. The relevant data used here is from "Stockpile Surveillance: Past and Future," Miller, Immele and Hagengruber, Los Alamos, Sandia and Lawrence Livermore National Laboratories, August 7, 1995, p. 12. Please see reproduction next to our table of weapons ages above and the original at http://www.fas.org/sgp/othergov/doe/lanl/osti/197796.pdf.

7. Plutonium pits are primarily made from the isotope Pu-239, which has a radioactive half-life of ~24,000 years. The aging of Pu-239 can be "accelerated" by "spiking" it with a fraction of Pu-238, which has a half-life of 88 years.

8. "Pit Lifetime," JASON, November 20, 2006, http://www.nukewatch.org/facts/nwd/JASON_Report-PuAging.pdf

9. Stockpile Stewardship and Management PEIS, DOE, 1996, Summary p. 19.

10. "Surprisingly, however, the high explosive used in U.S. weapons has been found to improve systematically with age in key measures of performance, such as yielding characteristics and detonation-front velocities." "Science-Based Stockpile Stewardship," Dr. Raymond Jeanloz, Physics Today, December 2000, p. 5, www.physicstoday.org/pt/vol-53/iss-12/p44.html

11. "Doubts cast on need for new nukes - Study finds plutonium may last twice as long as expected," James Sterngold, San Francisco Chronicle, November 15, 2006, http://sfgate.com/cgi-bin/article.cgi?file=/chronicle/archive/2006/11/15/MNGO4MCVVH1.DTL.

12. In this author's view, the May 2002 Moscow Treaty [Strategic Offensive Reductions Treaty] has many serious flaws, among which is no requirement for irreversible dismantlements and that it allows operational nuclear weapons to be simply shunted to a "responsive reserve" from which they could be redeployed. Senator Carl Levin (D.-MI), the soon-to-be chair of the Senate Armed Services Committee, called the latter "Arthur Andersen accounting."

13. "A Summary of the SNL Stockpile Life Study," Sandia National Laboratories, 1993, first page, see http://www.nukewatch.org/facts/nwd/Sandia_93_StockpileLife.pdf (parentheses in the original).

14. "We will increase dismantlements planned for FY 07 by nearly 50%, compared to FY 06… Warhead dismantlements are a key part of our strategy to ensure that stockpile and infrastructure transformation is not misperceived by other nations as 'restarting the arms race.'" Tom D'Agostino, NNSA Deputy Administrator for Defense Programs, April 5, 2006 testimony, http://www.nnsa.doe.gov/testimony.htm

15. "B" in NNSA nomenclature is for nuclear bombs and "W" nuclear warheads for missiles. Dashed numbers represent modifications from the original design, while the lack thereof or "0" represents the original design. "Average Age" assumes steady production with half produced by that age and half after.

16. The U.S. government classifies the numbers of active nuclear weapons. These numbers are taken from the widely respected estimates by Robert S. Norris of the Natural Resources Defense Council (NRDC) and Hans Kristensen of the Federation of American Scientists (FAS). See Nuclear Notebook, January 2006, www.thebulletin.org

17. "Nuclear Notebook," Norris & Kristensen, NRDC and FAS, September 2004, www.thebulletin.org

18. 2001 NPR Excerpts, p. 32, www.globalsecurity.org/wmd/library/policy/dod/npr.htm

19. "The surveillance program's role in assessing and ensuring confidence in the reliability of the weapons stockpile is increasingly important as the nuclear weapons stockpile ages. However, as a result of the continuing backlog of surveillance tests, the Department [of Energy] lacks vital information about the reliability of the stockpile." "Follow-up Audit on Stockpile Surveillance Testing," DOE Inspector General, DOE/IG-0744, October 2006, cover letter, http://www.ig.energy.gov/documents/IG-0744(2).pdf