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The Cart before the Horse:
DOE's Plan for the Future of the U.S. Nuclear Weapons Complex

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"This announcement puts the cart before the horse. Although a lot of time and energy went into determining the winning design for a new nuclear warhead, there appears to have been little thought given to the question of why the United States needs to build new nuclear warheads at this time. My preference is that the Department of Energy would have spent their resources reconfiguring the old Cold War complex and dismantling obsolete warheads."

- Rep. Pete Visclosky (D-IN), Chair, House Energy and Water Development Appropriations Subcommittee, March 2, 2007, on the announcement of the selection of the first Reliable Replacement Warhead design.

Executive Summary

Over the next several years, the U.S. government must make critical decisions about the future of the nation's nuclear weapons complex—the industrial infrastructure, largely built during the cold war, used to design, develop, build, and maintain the thousands of nuclear weapons in the U.S. arsenal. These decisions include the future purpose of the arsenal, the need for new warheads or replacement warheads, and how best to consolidate the complex.

Specifically, the U.S. government must decide:

- whether to increase the nation's capacity to produce plutonium pits—the essential core of nuclear warheads;
- whether to design, develop, and build a new generation of nuclear warheads, starting with the Reliable Replacement Warhead;
- how best to consolidate the fissile material essential to nuclear weapons, to increase security and reduce costs; and
- how to maintain the existing nuclear arsenal without resuming nuclear explosive testing.

These questions are important now because the Department of Energy (DOE) and its National Nuclear Security Agency (NNSA) have proposed a plan, called Complex Transformation, to revitalize the nuclear weapons complex. Complex Transformation—and a recently released environmental impact statement (EIS) on the plan—lay out the agency's vision for the future. That vision includes restoring the nation's ability to produce significant quantities of nuclear weapons, including the new Reliable Replacement Warhead.

These issues are also coming to the fore because Congress has required the next president to undertake a Nuclear Posture Review to examine the purpose of U.S. nuclear weapons, and established a Congressional Commission on United States Strategic Posture to consider the future of the nation's nuclear arsenal. Finally, these decisions will occur amid growing calls for the United States to spearhead a global effort to attain a world free of nuclear weapons.

Our assessment of the Complex Transformation proposal finds that:

The United States needs a new nuclear policy, and a plan for the future of its nuclear arsenal, before it makes major decisions on the future of the complex.

In particular, until the nation decides on the future size and characteristics of its nuclear arsenal, it is premature to build the Chemistry and Metallurgy Research Replacement (CMRR) Nuclear Facility and the Uranium Processing Facility (UPF).
The CMRR Nuclear Facility, proposed as part of Complex Transformation, would allow the nation to expand another facility's capacity to produce plutonium pits, which are at the core of all U.S. nuclear weapons. A proposed new UPF would replicate today's capacity to manufacture new "secondaries"—the components that produce most of the weapons' explosive yield. Any

decision on building these facilities should await a comprehensive review of U.S. nuclear weapons policy, and a plan for the future arsenal.

Under its current policy, the United States does not need to produce new plutonium pits until at least 2015, and perhaps not until 2022.
The only identified need for new pits today is to allow the nation to deploy its roughly 400 W88 warheads while maintaining enough of them in reserve to allow annual testing. As part of the process used to determine that the nuclear arsenal remains reliable, safe, and secure, the weapons laboratories destroy one W88 warhead each year. However, by the end of 2008, the United States will have produced enough certified new W88 pits to allow 6 to 12 years of continued testing.

The United States should resize the nuclear weapons complex from the bottom up.
After the nation decides on a long-term nuclear weapons policy, and the stockpile required to implement it, the NNSA should perform a comprehensive, bottom-up review of the complex, and maintain only those programs and facilities needed to support the future arsenal. As appropriate, the United States should then determine how best to use the substantial resources within the complex for other important scientific missions.

Consolidating weapons-usable fissile material should be a higher priority for the NNSA.
The NNSA recognizes that consolidating such material reduces security costs, and the danger of theft, accident, and radiological exposure. However, while the agency's proposed plans are a step in the right direction, it should speed up those efforts and expand their scope.

The DOE should examine other alternatives for the future of the complex.
The alternatives the DOE considered in its draft EIS for Complex Transformation were too limited in scope. In particular, the department should consider options for no pit production, and for a future in which the United States spearheads a global effort to move toward the prohibition of nuclear weapons.

1. Introduction

As the Bush administration nears its end, it has proposed a plan—called Complex Transformation—to revitalize the nation's nuclear weapons complex. This plan—only the latest in a long line of such proposals (see Box 1, p. 3)—would restore the nation's ability to produce significant quantities of new nuclear weapons. The plan would also consolidate some nuclear materials at fewer sites, and reduce some excess capacity in the complex.

The National Nuclear Security Agency (NNSA)—the semi-autonomous unit within the Department of Energy (DOE) that manages the nation's nuclear weapons facilities—sees the plan as transforming them into "a modernized, cost-effective nuclear weapons complex."[1] However, the nation needs to answer critical policy questions before making key decisions on the future of its nuclear weapons infrastructure.

This report outlines the evolution of the nuclear weapons complex, summarizes the Complex Transformation initiative, and makes recommendations for a path toward a sensible future.

2. The Evolution of the Nation's Nuclear Weapons Complex

The U.S. nuclear weapons complex is a sprawling collection of eight facilities at nine sites, many with buildings that are old and increasingly expensive to maintain.[2] Scientists at three national laboratories research, design, and develop nuclear weapons. When the Department of Defense (DOD) issues a formal military requirement for a new nuclear warhead, scientists at Livermore National Laboratory (in California) and Los Alamos National Laboratory (in New Mexico) create competing designs for the nuclear "physics package," which produces the nuclear explosion. The Nuclear Weapons Council, composed of representatives from both the Defense and Energy departments, selects the winning design. Each lab has designed about half the warhead types in the U.S. stockpile.

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[1] This plan was initially called Complex 2030 because it was to be completed by that year. See U.S. Department of Energy (DOE). 2006. *Complex 2030: An infrastructure planning scenario for a nuclear weapons complex able to meet the threats of the 21st century,* p. 2. Available at: *http://www.complextransformationspeis.com/Complex%202030%20-%20October%2023%202006.pdf*.

[2] The United States built the first facilities in what became the nuclear weapons complex under the Manhattan Project. Over time the complex grew to 15 major research and production sites across the country. These sites produced more than 10 new nuclear warheads per day for lengthy periods, as the U.S. arsenal expanded from roughly 6,000 weapons in 1957 to its peak of 32,000 in 1966. See Natural Resources Defense Council. 2006. "Nuclear Notebook: Global nuclear stockpiles, 1945-2006," *The Bulletin of Atomic Scientists*, July/August, p. 66. Available at: *http://thebulletin.metapress.com/content/c4120650912x74k7/fulltext.pdf*.

After the end of the cold war, the mission of the complex became increasingly uncertain as the number of warheads declined. For example, in 1991 President George H.W. Bush unilaterally removed thousands of short-range tactical nuclear weapons from bases in Europe and all navy surface ships. After more than a decade of negotiations and delays, the 1994 Strategic Arms Reduction Treaty (START) limited U.S. and Russian deployed long-range nuclear forces to 6,000 warheads and 1,700 delivery vehicles—a cut of roughly 50 percent.

Los Alamos produces some weapons components—primarily detonators, which trigger the nuclear explosion, and also houses the only facility that now produces plutonium "pits." A pit is the core of the primary, or first stage, of a modern nuclear weapon. It is surrounded by high explosives, which compress the pit and initiate a runaway fission chain reaction; this fission explosion ignites the secondary, or second-stage, of the weapon. The secondary, in which nuclear fusion takes place, produces most of the explosive power of the nuclear weapon.

Working at sites close to both Livermore and Los Alamos, scientists and engineers at Sandia National Laboratory collaborate with both those labs in developing the non-nuclear components of warheads. Sandia also ensures that all components of the warheads work together, and has facilities that produce some components.

The Pantex Plant (in Amarillo, TX) is the site for final assembly as well as dismantlement of nuclear weapons. It also stores more than 10,000 plutonium pits from dismantled weapons. The Y-12 National Security Complex (in Oak Ridge, TN) houses facilities that work with and store uranium, and that manufacture the secondaries.

The Kansas City Plant manufactures most of the non-nuclear components of nuclear weapons. Using control rods extracted from the Watts Bar nuclear reactor, the Savannah River Site (in South Carolina) extracts radioactive tritium gas, a key material used to boost the yield and efficiency of the fission primary. Tritium has a half-life of only 12.3 years, so it must be replenished frequently.

Finally, the NNSA conducts non-nuclear experiments at the Nevada Test Site (NTS)—the location for nuclear explosive testing until 1992. These experiments include "subcritical" explosions involving amounts of nuclear material too small to allow a nuclear chain reaction. NTS also maintains the ability to resume full-scale underground nuclear testing if needed.

The Stockpile Stewardship Program

In 1992 the Bush administration signed into law a temporary moratorium on nuclear explosive testing. After extending the moratorium, the Clinton administration joined multilateral negotiations on a Comprehensive Test Ban Treaty (CTBT), and President Clinton signed the CTBT in 1996. Although the Senate has not ratified the treaty, the United States continues to abide by it.[3]

In response to the moratorium, in 1993 the DOE launched a major program to maintain the U.S. nuclear arsenal without nuclear explosive testing. Under what is now called the Stockpile Stewardship Program (SSP), the DOE subjects each type of warhead to rigorous annual inspections, and conducts extensive testing on its components. This enhanced monitoring and assessment has allowed the NNSA to better understand the effects of aging on warhead safety, security, and reliability.

[3] The United States is obligated not to undermine the terms of the treaty unless and until the U.S. president informs the UN secretary general that the United States withdraws its signature.

Box 1: The Best-Laid Schemes—Proposals to Modify the Nuclear Weapons Complex

Numerous commissions have considered how to modify the U.S. nuclear weapons complex, but the DOE has not implemented most of their recommendations. Proposals, beginning with the most recent, include:

1. *Recommendations for the Nuclear Weapons Complex of the Future: Report of the Nuclear Weapons Complex Infrastructure Task Force*, Secretary of Energy's Advisory Board (SEAB), U.S. Department of Energy, July 13, 2005 (also known as the Overskei report).[1] Established by Secretary of Energy Samuel Bodman, the task force developed a plan to consolidate all nuclear materials and activities at one site, including production, dismantlement, stewardship, research and development, and nuclear weapons.

2. *Report of the Commission on Maintaining United States Nuclear Weapons Expertise: Report to the Congress and Secretary of Energy Pursuant to the National Defense Authorization Acts of 1997 and 1998,* March 1, 1999 (also known as the Chiles report).[2] This Congressional commission reviewed the DOE's efforts to attract scientific and technical personnel, and to produce a plan for recruiting and retaining such employees. Recommendations included complex-wide "rightsizing," reorganization to eliminate excessive DOE oversight and overlapping, unclear roles, and enhanced congressional oversight of the weapons program. (Henry Kendall, then chair of the board of directors of the Union of Concerned Scientists, served on the panel.)

3. *Record of Decision: Programmatic Environmental Impact Statement for Stockpile Stewardship and Management,* Department of Energy, December 19, 1996.[3] The Clinton administration proposed downsizing all existing nuclear sites rather than closing any, resuming limited pit production at Los Alamos, and building the National Ignition Facility.

4. *Alternative Futures for the Department of Energy National Laboratories,* by the Task Force on Alternative Futures for the Department of Energy National Laboratories, February 1995 (known as the Galvin report).[4] This panel recommended phasing out nuclear weapons work at Livermore, and basing future weapons production on residual capabilities at Pantex, Los Alamos, and Sandia. (Henry Kendall also served on this panel.)

5. *Nuclear Weapons Complex Reconfiguration Study,* Department of Energy, January 1991 (known as the Watkins report).[5] Like Complex Transformation, this report called for a "reconfigured complex, called Complex-21" that "would be smaller, less diverse, and less expensive to operate than the Complex of today. Complex-21 would be able to safely and reliably support nuclear deterrent stockpile objectives set forth by the President and funded by the Congress."

[1]Available at: *http://www.seab.energy.gov/publications/NWCITFRept-7-11-05.pdf*.
[2]Available at: *http://www.doeal.gov/LLNLCompetition/ReportsAndComments/chilesrpt.pdf*.
[3]Available at: *http://www.epa.gov/EPA-IMPACT/1996/December/Day-26/pr-17280.html*.
[4]Available at: *http://www.lbl.gov/LBL-PID/Galvin-Report/Galvin-Report.html*.
[5] Available at: *http://www.osti.gov/bridge/product.biblio.jsp?osti_id=6077838*.

With this knowledge, the NNSA is able to refurbish, replace, or fix warhead components before aging-related changes might reduce their safety and reliability. In some cases, tailored "life extension programs" are expected to extend the lifetime of the warheads by 20 to 30 years.

The shift from production to stockpile stewardship led to major investments in large-scale projects designed, according to the NNSA, to improve its ability to maintain the existing arsenal.

For example, the National Ignition Facility (NIF) at Livermore is intended to ignite a fusion reaction that would mimic the first microseconds of a thermonuclear explosion. The Dual-Axis Radiographic Hydrodynamic Test (DARHT) Facility at Los Alamos will use two linear accelerators—essentially large x-ray machines—to record three-dimensional images of materials undergoing a simulated nuclear explosion. The NNSA has also made enormous investments in high-speed supercomputer projects that allow detailed modeling of nuclear explosions.[4]

Despite significant problems plaguing NIF and DARHT, the Stockpile Stewardship Program has been a tremendous success.[5] The program has significantly advanced knowledge of the properties of aging fissile materials, dramatically improved the modeling of nuclear explosions, and verified that the U.S. arsenal remains safe and reliable. As a result, the laboratories have a better first-principles understanding of U.S. nuclear warheads than when the weapons first entered the stockpile. Indeed, based on this extensive program, the secretaries of energy and defense have certified to the president each year since 1997 that all types of warheads in the U.S. nuclear stockpile are safe, secure, and reliable.

Along with its changing role, the complex saw significant cuts in its size and budget. Between 1990 and 1997, the complex shrank by 50 percent, as the DOE shut down numerous production facilities and several sites.[6] In 1988, near the end of the cold war, the complex operated on a budget of about $9.9 billion per year and employed some 60,000 people.[7] By 2000, the annual budget had fallen to about $5.6 billion, and employment to about 24,500.

However, the second Bush administration has reversed these trends. The fiscal year 2008 budget for the complex is $6.3 billion, and employment at the complex has risen to more than 47,000.[8] The administration's budget request for fiscal year 2009 is more than $6.6 billion.

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[4] For a recent summary of the status of the large-scale stewardship programs, see Fitzpatrick, A., and I. Oelrich. 2007. *The stockpile stewardship program: Fifteen years on*. Washington, DC: Federation of American Scientists, April. Available at: *http://www.fas.org/2007/nuke/Stockpile_Stewardship_Paper.pdf*.

[5] The DOE has significantly scaled back the NIF, and it may never achieve fusion. After years of delays, DARHT will achieve the ability to work on a dual axis in 2008.

[6] In 1994 the DOE shut down all nuclear weapons-related work at the Pinellas Plant near Clearwater, FL, which produced the neutron generators used in nuclear warheads. In 1998 the DOE also shut down the Mound Plant near Dayton, OH, which manufactured the high-energy chemical explosives used to initiate the nuclear explosion and other non-nuclear components, and produced tritium gas for use in warheads. Other sites in the complex took on these functions.

[7] General Accounting Office (GAO). 2000. *Nuclear weapons: Improved management needed to implement stockpile stewardship program effectively*. GAO-01-48, p. 18. Available at: *http://www.gao.gov/new.items/d0148.pdf*.

[8] These figures are from the president's fiscal year 2009 budget request, released in February 2008. On April 16, 2008, the directors of Los Alamos and Livermore testified before Congress that employment at each lab had dropped by about 2,000 people in the previous 18 months.

3. The NNSA's Complex Plans

The NNSA's Complex Transformation plan draws much of its impetus from the Bush administration's 2001 Nuclear Posture Review (NPR), which called for a "revitalized defensive infrastructure" that would provide the capability to "design, develop, manufacture, and certify new warheads."[9] According to the NPR, this production capability will allow the United States to maintain its ability "to respond to large strategic changes" and "dissuade adversaries from starting a competition in nuclear armaments." The DOE has argued that this capability would also permit reductions in the "responsive force" of warheads that the nation keeps in reserve.[10]

In 2002, the NNSA proposed the Robust Nuclear Earth Penetrator (RNEP), a new warhead designed to destroy deeply buried underground bunkers. It also proposed building a Modern Pit Facility (MPF) to produce new plutonium pits. After providing modest initial support for both, Congress ultimately rejected those programs.

The NNSA has since searched for a nuclear weapons program that could garner congressional support. When it stopped the earth penetrator, Congress created the Reliable Replacement Warhead (RRW) program in 2004 to enable the agency to take modest steps to maintain confidence in the existing nuclear stockpile. However, the NNSA saw this new program as the engine that would transform the complex. It turned the RRW into a program to design and build a series of new warheads to replace most or all of the arsenal, and thereby justify a revitalized infrastructure. Congress turned against the NNSA's plans for the first new warhead, calling instead for a new nuclear policy to drive decisions on the arsenal and the complex. For fiscal year 2008, Congress cut off all funding for work on the RRW warhead.[11] Thus, the NNSA has realized that the Complex Transformation plan must survive on its own merits.

The Plan's Environmental Impact Statement

By law, the NNSA must review the environmental impact of Complex Transformation and reasonable alternatives that would achieve the agency's goal of making the complex "smaller, and more responsive, efficient, and secure."[12] A draft Supplemental Programmatic Environmental Impact Statement (EIS) with some 1,600 pages—released by the agency in January 2008—provides details about the alternatives but minimal explanation of the NNSA's "preferred alternative"—the option it intends to pursue.[13] (See Appendix 1 for the text of the preferred alternative.)

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[9] Although the Nuclear Posture Review is classified, significant extracts were leaked and widely distributed. These are online at *http://www.globalsecurity.org/wmd/library/policy/dod/npr.htm*.

[10] The responsive force includes nuclear weapons that the nation could add to its deployed forces over a period of days to years in response to an "evolving crisis." For example, deploying additional bombs could take days or weeks, while restoring 50 warheads to a squadron of Minuteman III intercontinental ballistic missiles (ICBMs) could take a year.

[11] Although Congress eliminated all RRW funding from the NNSA's budget, it did approve $15 million in the Pentagon's budget to investigate modifying Trident missiles to carry the first RRW warheads.

[12] National Nuclear Security Agency (NNSA). 2008. Draft complex transformation supplemental programmatic environmental impact statement (SPEIS), DOE/EIS-0236-S4, January 11, Chapter 1, p. 1-1. Available at: *http://www.complextransformationspeis.com/*.

[13] NNSA 2008.

The final version of the EIS is expected in the summer of 2008.[14] A "record of decision" describing the NNSA's final plans will follow. Key elements of the plan will require funding from Congress—something that is by no means assured.

The draft EIS includes several alternative plans:

- A "no-action" alternative would continue the status quo.
- A "distributed centers of excellence" alternative would essentially keep most activities where they are now, with some consolidation and major new facilities at several sites, including one that would produce 125 to 200 new plutonium pits per year. The NNSA's "preferred alternative" is very similar, except that it would not include a new pit facility.
- A "consolidated centers of excellence" alternative would consolidate all activities at one or two sites—a variation on the option proposed by the Secretary of Energy's Advisory Board in 2005 (see Box 1, p. 3).
- A "capabilities-based" alternative would maintain existing capacity except, notably, allowing the NNSA to upgrade pit production capacity to 50 per year.

However, the draft EIS does not consider in detail several reasonable alternatives. For example, the NNSA dismisses the notion of closing one of the two weapons design labs at Livermore and Los Alamos. It briefly cites a 1995 decision by President Clinton to maintain both sites, and asserts that there is no need to reconsider this question.[15]

This list also overlooks two options that are by every measure reasonable alternatives. One option is no production of new pits. As the next section explains, under current policy, the United States does not need to produce plutonium pits until at least 2015, and perhaps not until 2022. In a no pit production alternative, the NNSA could maintain its present capacity to produce about 10 pits per year, but would not actually produce any until it specifically needed them.

More broadly, the EIS does not consider the possibility that the United States would commit to making deep reductions in its arsenal in the near term, and to pursuing a prohibition on nuclear weapons over the longer term. This option has gained prominence largely because of a call by prominent former defense officials—George Shultz, secretary of state under Ronald Reagan, Henry Kissinger, secretary of state under Gerald Ford, Bill Perry, secretary of defense under Bill Clinton, and Sam Nunn, former chair of the Senate Armed Services Committee—for the United States to pursue a "world free of nuclear weapons." These proponents maintain that "reassertion of the vision of a world free of nuclear weapons and practical measures toward achieving that goal would be, and would be perceived as, a bold initiative consistent with America's moral heritage."[16]

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[14] A public comment period on the EIS ended on April 30, 2008. The NNSA had received more than 85,000 comments as of April 10, 2008. The vast majority of those comments have opposed the Complex Transformation plans.

[15] DOE 2008, p. 3–15.

[16] Shultz, George P., William J. Perry, Henry A. Kissinger, and Sam Nunn. 2007. "A World Free of Nuclear Weapons." *Wall Street Journal*, January 4, p. A15. Available at: *http://www.ucsusa.org/assets/documents/global_security/A-World-Free-of-Nuclear-Weapons.pdf*.

Given the credibility of these sponsors and the proposal's widespread support—it has won the backing of seven former secretaries of state and five former secretaries of defense—the NNSA should seriously consider this option in its EIS. Doing so would require examining the role of the labs in verifying the dismantlement of nuclear warheads, and in developing other transparency measures that will be essential as the world moves toward this goal. The EIS would also have to consider creating alternative missions for the weapons labs and nuclear production sites, retraining lab employees, and disposing of excess global stocks of plutonium.

Conclusion: The DOE should examine other alternatives for the future of the complex. *The alternatives the DOE considered in its draft EIS for Complex Transformation were too limited in scope. In particular, the department should consider options for no pit production, and for a future in which the United States spearheads a global effort to move toward the prohibition of nuclear weapons.*

4. Producing Plutonium Pits

From 1952 to 1989, the Rocky Flats Plant in Golden, CO, produced almost all the plutonium pits for U.S. warheads. At its peak, the plant manufactured thousands per year. But the DOE was forced to shut down the plant in December 1989, after the FBI raided it in response to serious environmental and safety concerns.

Since then, the NNSA has repeatedly sought to resume some level of pit production, or to build a dedicated facility to produce pits.[17] The efforts to restore modest production have faced serious technical and legal challenges, while Congress has refused to fund a dedicated new facility.

In 1996 DOE Secretary Hazel O'Leary announced a plan to resume production of new pits at Los Alamos. This decision was driven by the need to meet stockpile stewardship requirements.

To assess the reliability of the stockpile, each year the DOE removes 11 warheads of each type at random from the stockpile for disassembly and extensive testing. One of the 11 is destroyed during the tests, and the other 10 are reassembled and returned to the stockpile. As of 2004, only one pit for a W88 nuclear warhead was available to replace the one destroyed during testing.[18] Thus, testing the next year would have reduced the arsenal of deployed nuclear weapons by one.

[17] For example, in 1991 Secretary of Energy James Watkins announced a plan to resume pit production at Rocky Flats, and Congress approved a $283 million supplemental appropriation for emergency repairs. (This was the Watkins report—see Box 1, p. 3.) However, in 1992 President George H.W. Bush ended production of W88 pits as part of cuts in the U.S. nuclear arsenal, and in 1993 DOE Secretary Hazel O'Leary announced the permanent end of nuclear production at Rocky Flats.

[18] Medalia, Jonathan. 2004. *Nuclear warhead "pit' production: Background and issues for Congress*. Congressional Research Service, RL31993, updated March 29, p. CRS-3. This is an excellent summary of recent pit production. Online at *http://www.fas.org/spp/starwars/crs/RL31993.pdf*.

To avoid such forced reductions, the 1996 DOE plan had tasked Los Alamos with producing 50 to 80 new pits per year by 2005. But in 1997, after local opposition and problems updating facilities, DOE cut the required production level to 20 pits per year. The lab produced the first new certifiable pit—manufactured to stockpile standards—in 2003, but then encountered more delays. In September 2007 the agency announced that the first new W88 warhead with a new pit was certified for entry into the stockpile since 1989.[19] Los Alamos produced 11 pits for the W88 in 2007, of which 9 had been certified by late January 2008.[20] NNSA officials say they will produce six W88 pits in 2008.

The Plutonium Facility-4 (PF-4) building at Los Alamos makes the new W88 pits. According to the NNSA, PF-4 is nominally able to produce 20 pits per year, and it will be able to produce 30 to 50 pits per year by 2012.[21] Outside sources, however, say that staff members had to work around the clock for weeks to produce the 11 pits in 2007.[22]

Despite this new capacity, the NNSA has also sought to produce dramatically higher numbers of pits by building a dedicated production plant—even as both the deployed and total U.S arsenal (the latter includes nuclear weapons stored after removal from active deployment) moved toward dramatic reductions.

For example, after the release of the 2001 Nuclear Posture Review, the NNSA sought funding for a Modern Pit Facility capable of producing 125 to 450 new plutonium pits a year.[23] Yet the NPR called for significant reductions in the number of active U.S. warheads. And in May 2002, President Bush and Russian President Vladimir Putin signed the Moscow Treaty, which requires both countries to reduce their deployed warheads to 1,700 to 2,200 by the end of 2012.

Then, in 2004, President Bush announced that the United States was unilaterally cutting its total nuclear stockpile by almost half. Outside analysts estimated that this would bring the arsenal to around 5,000 warheads. Yet in 2005 the NNSA was still seeking funding for the MPF. At the 450-pit level, the facility would produce enough pits to replace the entire arsenal every 11 years.[24]

More recently, the NNSA sought the ability to produce fewer pits—but still through a dedicated facility. A 2006 proposal—*Complex 2030: An Infrastructure Planning Scenario for a Nuclear Weapons Complex Able to Meet the Threats of the 21st Century*—called for "a baseline capacity of 125 units per year net to the stockpile by 2022."[25] ("Net to the stockpile" means certified

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[19] U.S. Department of Energy (DOE). 2007. Rebuilt W88 warhead formally accepted for use in U.S. nuclear weapon stockpile. Press release, September 27. Online at *http://nnsa.energy.gov/news/896.htm*.

[20] Hebert, H. Josef. 2008. Quality of nuclear devices questioned. Associated Press, January 20. Online at *http://www.wtopnews.com/?nid=116&sid=1329887*.

[21] DOE 2008. Chapter 3, p. 3-7.

[22] Conversation with Greg Mello, Los Alamos Study Group, January 24, 2008.

[23] U.S. Department of Energy (DOE). 2003. Draft supplemental programmatic environmental impact statement on stockpile stewardship and management for a Modern Pit Facility. DOE/EIS-0236-S2. May. Online at *http://www.eh.doe.gov/nepa/docs/deis/deis0236S2/deis0236.htm*.

[24] For a revealing and somewhat comical story about the Modern Pit Facility and relations between Congress and the NNSA, see Sterngold, James. 2008. Failure to launch. *Mother Jones* (January/February). Online at *http://www.motherjones.com/news/feature/2008/01/failure-to-launch.html*.

[25] DOE 2006, p. 11.

warheads introduced into the arsenal, so actual production ability could be significantly higher.) A "consolidated plutonium center" at an existing NNSA site would provide "long-term R&D, surveillance, and manufacturing operations."[26]

Only with the release of the draft EIS for the Complex Transformation plan did the NNSA abandon, at least for now, the idea of a dedicated facility for producing plutonium pits. In the January 2008 EIS, the NNSA's "preferred alternative" is 50 to 80 pits per year, which it plans to achieve by expanding pit production at Los Alamos.

When questioned, NNSA Administrator Tom D'Agostino said that two developments made this change possible.[27] First, new DOE data show that plutonium pits will last significantly longer than previously thought, a finding confirmed by the Jasons, an independent scientific body that advises the government.[28] Second, the planned cuts in the total U.S. arsenal reduced the requirements for new pits. In December 2007, the administration announced that it would achieve the reductions announced in 2004 by the end of 2007—five years ahead of schedule—and that the nation would cut its total arsenal by another 15 percent by 2012.[29]

To achieve the 50-to-80-pits-per-year capacity, the proposal calls for reorganizing operations at the PF-4 facility at Los Alamos and building a new one, the Chemistry and Metallurgy Research Replacement (CMRR) Nuclear Facility, also at Los Alamos.[30] The new facility would primarily test the purity of the plutonium used in the pits, but it would allow pit production to expand at PF-4 by taking on some of its work, and by storing some fissile materials that would otherwise be stored at PF-4.[31]

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[26] DOE 2006, p. 11.

[27] Author Stephen Young asked this question during the public presentation of the Department of Energy's budget, February 4, 2008.

[28] Hemley, R. J., and D. Meiron. 2007. Pit lifetime. JSR-06-335. Bedford, MA: Mitre Corp, January 11. Online at *http://www.fas.org/irp/agency/dod/jason/pit.pdf*.

[29] D'Agostino, Thomas. 2007. Press conference: Announcement on Complex Transformation. Washington, DC: National Nuclear Security Administration, December 18.

[30] The CMRR Nuclear Facility is part of a larger project at Los Alamos. Construction of phase one—a radiological lab—is already under way. The NNSA's fiscal year 2009 budget request for the full CMRR project is $100.2 million. However, the request estimates that the full cost of the Nuclear Facility alone will top $2 billion.

[31] Although the DOE says the CMRR Nuclear Facility is still in its planning phase, the 2008 report from the House Energy and Water Development Appropriations Subcommittee tells a different story:

> The CMRR facility has no coherent mission to justify it unless the decision is made to begin an aggressive new nuclear warhead design and pit production mission at Los Alamos National Laboratory. The NNSA is directed to develop a long-term plan to maintain the nation's nuclear stockpile requirements that does not assume an *a priori* case for the current program. Production capabilities proposed in the CMRR should be located at the future production sites identified in a detailed complex transformation plan that supports the long-term stockpile requirements. The Committee is concerned the NNSA is proceeding with large expenditures for this project while there are significant unresolved issues, and recommends the fiscal year 2007 funding be held in reserve. Although the NNSA claims the Nuclear Facility Phase 3 of the project is under review, the Committee notes the Laboratory excavated 90,000 cubic yards of soil at the construction site where the CMRR Phase 3 Nuclear Facility is proposed to be built.

See: Committee on Appropriations. 2007. House Report 110-185, Energy and water development appropriations bill, 2008, to accompany H.R. 2641, June 11.

In shelving its proposal for a new facility dedicated to producing pits, the NNSA is acknowledging that the idea does not have congressional support. Since Rocky Flats closed in 1989, Congress has not been willing to provide significant funding for any DOE proposal to create such a capacity. In fact, in the fiscal year 2008 appropriations bill, Congress specifically limited the NNSA to producing the number of pits called for in its new preferred alternative:

> Until a modern nuclear weapons strategy, including required pit production capacity defined by nuclear stockpile requirements, is developed, the NNSA is directed to constrain the out-year planning for plutonium operations to a pit production capacity no greater than 80 pits per year. The NNSA Administrator is directed to provide quarterly reports to the Committees on Appropriations on pit production, with the first report due on April 1, 2008.[32]

Potential Reasons to Build New Pits

Beyond the near-term cuts in nuclear weapons already noted, the United States has no strategy in place to determine how much pit production capacity it may actually need. The nation might need new pits for several reasons. These include: (1) to replace pits at the end of their lifetime; (2) to replace pits destroyed in testing; (3) to increase the size of the arsenal, or to replace a class of defective warheads; (4) to build more of one warhead type to replace another type; and (5) to produce new types of warheads, such as those envisioned under the Reliable Replacement Warhead program.

Replacing Pits at the End of Their Lifetime

The pits in today's nuclear arsenal were produced largely between 1980 and 1989. (The exception, the W62, will be retired in 2009.) Before 2006, the DOE estimated that these pits would last 45 to 60 years.

Concern about how long the pits would remain reliable was one of the primary reasons for seeking the ability to produce new ones, and a key initial justification for the RRW program. However, the 2007 study by the Jasons on pit lifetimes found that "most primary types 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."[33]

This means the United States has *at least* until 2080—more than 70 years—to replace all the pits in its arsenal. Thus, there is no urgent need to expand pit production for this purpose—and it would be a costly mistake to do so before creating a long-term strategic plan for the nation's nuclear arsenal.

[32] U.S. Congress. 2008. Consolidated Appropriations Act, 2008, Division C, Energy and Water Development and Related Agencies Appropriations Act 2008, explanatory statement. It is unclear if the NNSA decided to reduce production requirements to 50 to 80 pits before or after Congress passed its limitation.
[33] Hemley and Meiron 2007.

Moreover, each year accelerated aging experiments provide data on 17 years of natural aging, so the DOE is quickly accruing more knowledge of pit lifetimes. For example, the DOE will learn whether its pits remain reliable for at least 150 years by 2010, and for at least 200 years by 2014.

Even if the DOE finds that pits will last only 100 years, the nation could easily wait two decades before beginning to replace them. To reduce the size of any new facility, the department could spread this work over many decades. If the NNSA began pit replacement in 2030 and completed it by 2080, the size of the arsenal would determine the needed average annual capacity (see Table 1).

Table 1: Required Annual Pit Production Capacity, under Various Arsenal Sizes

Size of the U.S. nuclear arsenal in 2080	Required average annual pit production, starting in 2030
1,000	20
2,000	40
3,000	60
5,000	100

Replacing Pits Destroyed under the Stockpile Stewardship Program

As noted, tests under the Stockpile Stewardship Program destroy one pit from each type of warhead every year. Large numbers of reserve warheads are available for all but one of the nine types now in the arsenal. That one is the W88 warhead, which is deployed on submarines. The DOE intended to build several thousand W88 warheads to replace W76s, but produced only some 400 before shutting down the Rocky Flats plant.[34]

As noted above, as of 2004, only one W88 pit was available to replace the one destroyed during testing. Los Alamos produced 11 new pits in 2007, of which 10 had been certified by late January 2008, and the lab plans to produce an additional six in 2008.

Assuming that testing in 2005 and 2006 reduced the deployed arsenal by two W88 warheads, as of late January 2008, enough W88 pits had been certified to replace those two deployed warheads and to allow destructive testing through 2014. If the remaining seven pits produced through 2008 are certified, there will be enough to allow testing through 2021. Thus, to maintain the current level of deployed W88s, new pits would be needed as soon as 2015 or as late as 2022.

There is no immediate need to produce new pits. And a new nuclear weapons policy could reduce or eliminate the number of W88 warheads in the U.S. arsenal, further extending the time until new W88 pits are needed, or eliminating the need entirely.

[34] See Norris, Robert S. 1985. "Counterforce at sea: The trident II missile." *Arms Control Today*, September; and Norris, Robert S., and Hans M. Kristensen. 2008. "Nuclear notebook: U.S. nuclear forces, 2008." *Bulletin of the Atomic Scientists*, March/April, p. 52. The latter is available at: *http://thebulletin.metapress.com/content/pr53n270241156n6/fulltext.pdf*.

Increasing the Arsenal or Replacing a Class of Defective Warheads

The United States maintains a stockpile of thousands of reserve nuclear warheads that the nation removed from deployment at the end of the cold war. Rather than destroy these warheads, the Clinton administration decided that the nation needed this large nuclear "hedge" to respond to any potential threat from a resurgent Russia, or to replace a class of warheads found to be defective.

Many experts believe so large a hedge is unnecessary.[35] Nevertheless, the NNSA argues that the nation could reduce it only if the agency builds up the weapons complex to be "responsive." That is, the agency must establish and maintain a capability to quickly produce large numbers of new warheads. The NNSA further argues that the effort to design, develop, produce, and deploy new Reliable Replacement Warheads would create such a responsive infrastructure.

As noted, however, the existing nuclear stockpile is highly reliable, and the likelihood of a defective class of warheads is extremely low. The secretaries of energy and defense continue to certify annually that all warhead types in the U.S. nuclear stockpile are safe, secure, and reliable**.**

As part of planning for the RRW, the DOE has estimated that acquiring the ability to produce significant numbers (more than tens) of new warheads would take 15 years. That estimate should be tempered by the DOE's poor track record in building large-scale facilities on schedule.[36]

On the other hand, if a new threat did emerge, the nation might be able to produce a significant number of nuclear weapons in fewer than 15 years. After all, in the 1940s, the United States went from mere belief that a nuclear weapon could work to an arsenal of more than 200 weapons in seven years. Moreover, the United States still stores over 10,000 pits in Texas, which could also be a source of new warheads if the need emerged. This approach would presumably take considerably less time than building new pits.

Given these considerations, the nation does not need to enhance its capacity to produce pits to expand the nuclear arsenal or replace defective warheads.

Building More of One Type of Warhead to Replace Another

Each long-range delivery vehicle in the U.S. arsenal—land-based missiles, sea-based missiles, and bombers—has two associated warhead designs. This provides even greater redundancy, in case a defect emerges in one type of warhead. However, the United States might want more of one type of warhead than another because of their capabilities. In particular, submarine-based ballistic missiles carry either W76s or W88s. The latter have a much higher yield, or explosive

[35] See, for example, Blair, Bruce G., Cochran, Thomas B. et al. 2008. *Toward true security: Ten steps the next president should take to transform U.S. nuclear weapons policy*, Federation of American Scientists, Natural Resources Defense Council, Union of Concerned Scientists, February. Online at: *http://www.ucsusa.org/truesecurity*.

[36] See, for example, U.S. Government Accountability Office (GAO). 2007. Department of Energy: Major construction projects need a consistent approach for assessing technology readiness to help avoid cost increases and delays. Report to the House Subcommittee on Energy and Water Development, and Related Agencies, Committee on Appropriations. GAO-07-336, March. Online at *http://www.gao.gov/new.items/d07336.pdf*.

force, than the former. An administration might decide it wants to deploy more than the current number of roughly 400 W88s, requiring the production of additional W88 pits.

However, the United States has not made a decision to do so, again because it has not developed a plan for the future of the arsenal.

Building New Types of Warheads

The NNSA is seeking funding for work on the first Reliable Replacement Warhead—a new design built from scratch. If the program goes ahead, the agency could need several thousand new pits. However, as noted, Congress eliminated all funding for the RRW in 2008. Moreover, the fiscal year 2008 defense authorization bill requires the NNSA to study whether the RRW program could reuse existing pits, and how doing so "would affect the schedule and scope for new pit production."[37]

The 2001 Nuclear Posture Review also indicates the Bush administration's desire to develop new capabilities for nuclear weapons. These include a "bunker buster" (the Robust Nuclear Earth Penetrator), intended to destroy hardened, deeply buried targets, a warhead intended to destroy stockpiled chemical or biological agents, and a lower-yield "mini-nuke" with a goal of limiting collateral damage.[38]

However, beyond the abandoned RNEP program, the administration has not initiated any specific programs for new warhead capabilities. The 2001 Nuclear Posture Review does not create an official requirement that the NNSA must fulfill. Given congressional opposition to both the RNEP and the RRW, there is no justification for establishing significant ability to produce pits for new types of warheads.

Conclusion: Under its current policy, the United States does not need to produce new pits until at least 2015, and perhaps not until 2022. *Currently, the only identified need for new pits is to allow the nation to deploy its roughly 400 W88 warheads while maintaining enough of them in reserve to allow annual testing. As part of the process used to determine that the nuclear arsenal remains reliable, safe, and secure, the weapons laboratories destroy one W88 warhead each year. However, by the end of 2008, the United States will have produced enough certified new W88 pits to allow 6 to 12 years of continued testing. Any decision on future pit production and construction of the CMRR Nuclear Facility must await a comprehensive review of U.S. nuclear weapons policy and a plan for the future arsenal.*

[37] U.S. Congress. 2007. National defense authorization act for fiscal year 2008: Conference report to accompany H.R. 1585. Report 110-477, Section 3121.

[38] According to the 2001 Nuclear Posture Review, "New capabilities must be developed to defeat emerging threats such as hard and deeply buried targets (HDBT), to find and attack mobile and relocatable targets, to defeat chemical or biological agents, and to improve accuracy and limit collateral damage. Development of these capabilities, to include extensive research and timely fielding of new systems to address these challenges, are imperative." See *http://www.globalsecurity.org/wmd/library/policy/dod/npr.htm.*

5. Producing Secondaries for Nuclear Weapons

As part of downsizing under its preferred alternative, the NNSA would consolidate almost all uranium operations of the nuclear weapons complex, as well as storage of highly enriched uranium, at the Y-12 site in Oak Ridge.[39]

The Uranium Processing Facility (UPF), likely located at the Y-12 site, would process enriched uranium and manufacture warhead secondaries, cases, and other weapons components. The secondary and the case it comes in compose a "canned subassembly"—the final product Y-12 ships to Pantex, which assembles the warhead.

The Y-12 plant already makes canned subassemblies for B61 warheads, and components for W76 warheads, as part of life extension programs for both. According to an official at Y-12, the capacity at that plant is "roughly the same" as that of the planned UPF, although the current facilities are much larger than needed.[40]

The UPF would also take on activities now performed at other buildings at Y-12, including the testing and dismantling of components of nuclear weapons, and R&D on enriched uranium. The NNSA is slating site preparation to begin around 2010, work completion to occur around 2016, and operations to begin in 2018.

The UPF could produce 125 to 200 canned subassemblies per year, even though the NNSA's preferred alternative for the future of the complex now calls for producing only 50 to 80 pits annually.[41] The draft EIS states that the DOE needs the ability to manufacture more secondaries than pits because the former may have shorter lifetimes. The NNSA claims that it could use any excess production capacity to dismantle its large backlog of excess canned subassemblies.

If the UPF is built at Y-12, it would be adjacent to the Highly-Enriched Uranium Materials Facility (HEUMF), now being built to consolidate storage of highly enriched uranium, and scheduled for completion in 2008. The NNSA estimates that the UPF would occupy 33 percent less space than the buildings now spread across the Y-12 site, and that together that facility and the HEMPF would reduce Y-12's high-security footprint by up to 90 percent.

In 2005, the DOE estimated that the UPF would cost $600 million to $1.1 billion. However, the actual cost could be substantially higher, given that the HEUMF is now expected to cost $549 million—four times the DOE's estimate when it first proposed the facility in 1999.

Conclusion: ***Until the nation establishes a new nuclear weapons policy, it cannot determine the right size for a new Uranium Processing Facility, so a decision to build such a facility would be premature.***

[39] Stored uranium would include all highly enriched uranium now at other sites in the weapons complex, but not material dedicated to providing fuel for U.S. naval reactors on submarines and aircraft carriers.
[40] Munger, Frank. 2008. Weapons planning in Oak Ridge. Atomic City Underground, knoxnews.com blog. Online at *http://blogs.knoxnews.com/knx/munger/2008/02/y12_secondaries_and_the_upf.html*.
[41] DOE 2008, pp. 2-13–2-14.

6. Downsizing the Complex

According to the NNSA website, the agency plans to eliminate old buildings and reduce redundancy and excess capacity as part of Complex Transformation. The agency says the plan would:

- "Consolidate special nuclear materials at five sites by the end of 2012, with reduced square footage within those sites by 2017;
- "Close or transfer from weapons activities about 600 buildings or structures, many by 2010;
- "Cease NNSA operations of two major testing sites supporting our laboratories by 2015;
- "Reduce the square footage of buildings and structures supporting weapons missions by as much as one-third, going from greater than 35 million to less than 26 million square feet;
- "Employ 20-30% fewer workers directly supporting weapons missions consistent with a smaller, more efficient complex;
- "Dismantle weapons at a significantly faster pace."[42]

However, these highlights do not mention the NNSA's plan to increase its pit production capacity. What's more, although the NNSA would consolidate some activities under its preferred scenario, every site would remain open, and the DOE would build several major new facilities. These include the Uranium Processing Facility, the Chemistry and Metallurgy Research Replacement project, as well as an entirely new facility for producing non-nuclear components at the Kansas City plant—a proposal the draft EIS does not address.

The Complex Transformation proposal also fails to consider the supercomputers at the nation's weapons labs. Sandia's Red Storm, Los Alamos' Q, and Livermore's BlueGene/L and ASC Purple have each vied for the title of fastest computer in the world. To achieve even higher speeds, Los Alamos is now working on Roadrunner, and Livermore on Sequoia. The nation has spent billions of dollars on these computers, yet the labs often seem to be competing with each other rather than trying to build the tools needed to sustain the U.S. nuclear weapons stockpile.

The EIS also makes little mention of the new facilities that are finally coming online or approaching initial operating capability. The National Ignition Facility is scheduled to finish construction in the next year, while the Dual-Axis Radiographic Hydrodynamic Test Facility will soon achieve its intended, two-axis design capability. Both of these facilities have long been described as critical to stockpile stewardship

The entire nuclear weapons complex needs a fundamental, bottom-up review. That review should take place *after* the next president completes a new Nuclear Posture Review, and Congress and the next administration make decisions about the future of the U.S. stockpile.

[42] National Nuclear Security Agency. 2008. Complex Transformation. Online at *http://nnsa.energy.gov/defense_programs/complex_transformation.htm*.

At that point, the NNSA should conduct a clear-headed analysis of the facilities the nation needs to meet the goals of the new policies. The agency should use an approach similar to zero-based budgeting: rather than looking for areas where the complex can be trimmed, the NNSA should show that every program and expenditure helps meet the needs of the stockpile plan, regardless of how much the agency has spent on any given program in the past.

If the substantial scientific and technical resources currently present in the complex are not all needed under a new nuclear weapons policy, the United States should determine how best to utilize those resources for other important scientific missions.

Conclusion: The United States should resize the nuclear weapons complex from the bottom up. *After the nation decides on a long-term nuclear weapons policy, and the stockpile required to implement it, the NNSA should perform a comprehensive, bottom-up review of the complex, and maintain only those programs and facilities needed to support the future arsenal. As appropriate, the United States should then determine how best to use the substantial resources within the complex for other important scientific missions.*

7. Consolidating Weapons-Usable Fissile Materials

After pit production, perhaps the most significant element of the NNSA's plans is to decrease the number of sites that store or use weapons-usable fissile materials. In 2005, the Secretary of Energy's Advisory Board developed a plan to consolidate all nuclear materials and activities at one site, including production, dismantlement, stewardship, R&D, and storage of excess nuclear weapons and nuclear materials (see Box 1, p. 3). The NNSA rejected this proposal, it said, because the costs of such consolidation were too high. It is also worth noting, however, that having facilities spread across many states helps generate support for the complex, as local jobs play a role in building congressional support.

Under its preferred alternative, the NNSA would reduce the number of facilities with weapons-usable materials from seven to five by 2012. By that date, it plans to remove all Category I/II special nuclear materials[43] from Livermore and Sandia. In fact, the agency announced on February 28, 2008, that it had already reached that goal for Sandia, seven months ahead of schedule. However, the draft EIS notes that significant quantities of weapons-usable materials may return to Sandia for specific experiments, and smaller quantities—less than Catergory II amounts—of such materials are likely to remain at these sites.

Consolidation is a priority for the NNSA regardless of the outcome of the Complex Transformation process, because the greater protection mandated by the DOE following the September 11 attacks has led to higher security costs. The DOE has raised the standard for

[43] "Special nuclear materials" are fissile materials that can be used to make nuclear weapons, including plutonium and highly enriched uranium. Category I includes material in sufficient quantities to make at least one nuclear weapon, while Category II includes smaller amounts of the same material, or uranium that is not enriched enough to make nuclear weapons.

protection that its facilities must meet twice since 9/11, and reports that its facilities have met the first standard but are still working to achieve the second.[44]

The NNSA's proposed efforts to consolidate highly enriched uranium and plutonium would move in the right direction, but they are relatively modest. Removing such materials from Sandia ahead of schedule is a significant achievement. The NNSA should also advance the timeline for removing special nuclear materials from Livermore.

Conclusion: Consolidating weapons-usable fissile material should be a higher priority for the NNSA. *The NNSA recognizes that consolidating such material reduces security costs, and the danger of theft, accident, and radiological exposure. However, while the agency's proposed plans are a step in the right direction, it should speed up those efforts and expand their scope.*

8. Visions for the Future

To make sound decisions about the future of its nuclear weapons complex, the United States must have a blueprint for the size and composition of its nuclear arsenal over the next several decades. This is particularly true of decisions on whether to build new facilities that could operate for the next half-century. However, no such blueprint for the arsenal exists, and until one does, the NNSA will be unable to produce an appropriate plan for the future of the complex. Thus it is premature for the agency to seek funding for several of the facilities it proposes.

The GAO offers similar guidance. The first step in the GAO recommendations for transforming the complex requires the Department of Defense to "establish clear, long-term requirements for the nuclear stockpile by determining the types and quantities of nuclear weapons needed to provide for our nation's nuclear deterrent."[45] The NNSA should develop options only after the U.S. military defines requirements.

That view is also shared by the House Energy and Water Development Appropriations Subcommittee, which has jurisdiction over nuclear weapons research, development, and production. In its report on the fiscal year 2008 Energy and Water Development Appropriations bill, the subcommittee maintained that it would not support any funding for Complex Transformation until the United States had (1) developed a nuclear weapons strategy for the future, (2) used this strategy to derive military requirements for the size and composition of the nuclear arsenal, and (3) used these requirements to define the current and future needs of the nuclear weapons complex.[46] While the final omnibus fiscal year 2008 appropriations bill

[44] National Nuclear Security Agency. 2008. Design basis threat. Online at: *http://nnsa.energy.gov/nuclear_security/design_basis_threat.htm*.

[45] Aloise, Gene. 2006. "Testimony Before the Subcommittee on Energy and Water Development, Committee on Appropriations, House of Representatives: Nuclear Weapons: Views on Proposals to Transform the Nuclear Weapons Complex," GAO-06-606T, April 6. Available at: *http://www.gao.gov/new.items/d066061.pdf*.

[46] From the subcommittee's report: "The Committee believes it is premature to proceed with further development of the RRW or a significant nuclear complex modernization plan, until a three-part planning sequence is completed, including: (1) a comprehensive nuclear defense strategy, based upon current and projected global threats; (2) clearly

reversed some of the funding cuts made by the subcommittee, those principles have widespread congressional support.

In fact, Congress has taken a direct role in calling for a new nuclear weapons policy. The fiscal year 2008 Defense Authorization Act created Congressional Commission on United States Strategic Posture. Recently appointed and chaired by former secretary of defense Bill Perry, the commission will conduct "a strategic threat assessment and a detailed review of nuclear weapons policy, strategy, and force structure" for the next administration.[47] The same bill requires that the next administration undertake its own Nuclear Posture Review, which should assess the "nuclear weapons complex that will be required for implementing the United States national and military strategy, including any plans to modernize or modify the complex."[48]

Conclusion: The United States needs a new nuclear policy, and a plan for the future of its nuclear arsenal, before it makes major decisions on the future of the complex.

defined military requirements for the size and composition of the nuclear stockpile derived from the comprehensive nuclear defense strategy; and (3) alignment of these military requirements to the existing and estimated future needs and capabilities of NNSA's weapons complex. The Committee views completion of this three-part planning sequence as a necessary condition before considering additional funding for Complex 2030 and RRW activities." U.S. Congress. 2007. Report 110-185.

[47] U.S. Congress. 2007. National Defense Authorization Act for fiscal year 2008: Conference report to accompany H.R. 1585. Report 110-477, Section 1062.

[48] Ibid, Section 1070.

Appendix I

Preferred Alternative from *Draft Complex Transformation Supplemental Programmatic Environmental Impact Statement* (EIS)

Preferred Alternatives

CEQ regulations require an agency to identify its preferred alternative to meet its purpose and need, if one exists, in a Draft EIS (40 CFR 1502.14(e)). At this time, NNSA has identified the preferred alternatives as described below. This is based on the consideration of environmental impacts described in this Draft SPEIS, as well as consideration of other factors such as mission and infrastructure compatibility, economic analyses, safety, safeguards and security, and workforce training and retention.

Restructuring SNM Facilities Preferred Alternatives

Pursue Distributed Centers of Excellence as follows:

- Plutonium Manufacturing and R&D: Los Alamos (50/80 Alternative) would provide up to 80 pits per year enabled by construction and operation of the Chemistry and Metallurgy Research Replacement - Nuclear Facility (CMRR-NF). Other national security actinide needs and missions would be supported at TA-55 on a priority basis (e.g., emergency response, material disposition, nuclear energy).

- Uranium Manufacturing and R&D: Y-12 would continue as the uranium center providing component and canned subassembly production, surveillance and dismantlement. Independent of this SPEIS, NNSA is completing construction of the HEUMF and consolidating HEU storage in that facility; and can proceed with the preliminary design of a UPF that could be located at any of the sites under consideration in this SPEIS.

- Assembly/Disassembly/High Explosives Production and Manufacturing: Pantex would remain the Assembly/Disassembly/High Explosives production and manufacturing center. Consolidate non-destructive surveillance operations at Pantex.

- Consolidation of Category I/II SNM: Phase-out Category I/II operations at LLNL Superblock by the end of 2012. Consolidate Category I/II SNM at Pantex within Zone 12, and close Zone 4.

Restructuring R&D and Testing Facilities Preferred Alternatives

HE R&D. Reduce footprint of NNSA weapons activity HE production and R&D; reduce number of firing sites as well. Use of energetic materials for environmental testing (e.g., acceleration or sled tracks, shock loading, or in explosive tubes) is not included in HE R&D.

Consolidate weapons HE R&D and testing at the following locations by 2010.

- Pantex would remain the HE production (formulation, processing, and testing) and machining center. All HE production and machining to support nuclear explosive package (NEP) development is performed at Pantex. HE experiments up to 22 kg HE could remain at Pantex.
- NTS would remain the R&D testing center for large quantities of HE (greater than 10 kg);
- LLNL would be the HE R&D center for formulation, processing, and testing (less than 10 kg) HE at the High Explosives Applications Facility (HEAF);
- SNL/NM would remain the energetic devices R&D center (less than 1 kg of HE) at the existing Explosives Test Facility (ETF); and
- LANL would produce HE detonators and conduct contained HE R&D.

Maintain one open-burn/open detonation area at each site for safety and disposal purposes.

Tritium R&D. Consolidate Tritium R&D at SRS. SRS would remain the site for tritium supply management and provide R&D support to production operations and gas transfer system development. Neutron generator loading at SNL/NM and production of National Ignition Facility targets at LLNL, which involve small quantities of tritium, would continue and would not be included in this consolidation. Move bulk quantities of tritium from LANL to SRS by 2009. Remove tritium materials above the 30 gram level from the Weapons Engineering Tritium Facility (WETF) at LANL by 2012.

NNSA Flight Test Operations. Cease NNSA operation of TTR in approximately 2009 and conduct flight testing at a DoD facility. No Category I/II SNM will be used in future flight tests.

Hydrodynamic Testing. Cease open-air hydrotesting at LANL and LLNL in 2009, and conduct future open-air hydrotesting at NTS. Consolidate in-place LANL and LLNL hydrotesting facilities. Close CFF at LLNL in approximately 2015 which could enable transfer or closure of Site 300. As the LANL Dual Axis Radiographic Hydrodynamic Test (DARHT) facility approaches end of life in approximately 2025, plan for a next generation facility at the NTS.

Major Environmental Test Facilities. Consolidate major environmental testing at SNL/NM and conduct infrequent operations requiring Category I/II SNM in security campaign mode. Close LANL and LLNL major environmental testing facilities by 2010 (except those in LLNL Building 334). Move environmental testing of nuclear explosive packages currently performed in LLNL Building 334 to Pantex by 2012. As SNL/NM facilities used for infrequent Category I/II SNM testing (Annular Core Research Reactor and Aerial Cable Facility) reach the end of their life, NNSA would evaluate building replacement facilities at NTS.

National Nuclear Security Agency. 2008. DOE/EIS-0236-S4, January 11, p. 3-17-18, available at: *http://www.complextransformationspeis.com/project.html*.