

# **Project On Government Oversight**

## **Uranium Processing Facility: When You're in a Hole, Just Stop Digging**

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## EXECUTIVE SUMMARY

The Department of Energy's (DOE) National Nuclear Security Administration (NNSA) is proceeding with plans to construct the Uranium Processing Facility (UPF),<sup>1</sup> currently estimated to cost over \$11 billion, at the Y-12 National Security Complex in Oak Ridge, Tennessee. The UPF is intended to support several nuclear projects such as providing uranium feedstock for use by the Naval Reactors Program, the disassembly of nuclear bomb secondaries, and, when necessary, the assembly of new secondaries from refurbished and new components. However, costs have skyrocketed from the original 2005 estimate of \$600 million to over \$11 billion today, the operational date has fallen at least 20 years behind schedule, and questions about the facility's mission abound. Meanwhile alternatives to this costly option wait to be explored in the darkened wings.

### Major Findings:

- There is significant evidence to suggest that some aspects of the UPF mission can be carried out at the Pantex Plant in Amarillo, Texas, and with a few modifications and refurbishments, at existing facilities at Y-12.
- It is not at all clear what capacity will be required for the recertification of nuclear bomb secondaries, one of UPF's most important missions, nor whether it will be necessary to remanufacture any secondaries. DOE officials are withholding this information with a claim of top secret classification and there have been no independent studies to determine the lifetime of secondaries.
- In 2005, the UPF was expected to be functioning in 2018, however, now the facility isn't expected to be fully operational until 2038. Poor project management and a design flaw contributed to the serious cost overruns the NNSA is now facing on this project. Investigations into the design flaw found that: "Early estimates, which showed the need for a higher cost range, were apparently disregarded to gain approval to proceed with the project."
- The former chairman of the Secretary of Energy Advisory Board's Nuclear Weapons Complex Infrastructure Task Force has expressed concerns that by the time the facility is fully operational in 2038 its mission will be obsolete. The former chairman does not foresee this multi-billion dollar facility "contributing to the mission of the NNSA."
- The NNSA continues to pursue an above-ground design that is not only significantly more difficult to secure but also more costly and will ultimately take longer to construct.
- The Government Accountability Office raised concerns in late 2010 that several new technological advancements planned for the UPF mission will not reach a developmental stage where it can be assured that they will perform correctly before the facility is to be operational.

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<sup>1</sup> The project was recently renamed the Uranium Capabilities Replacement Project (UCRP) which will contain the new UPF as well as support infrastructure. Department of Energy, Office of Management, Budget and Evaluation/CFO, *Department of Energy FY 2014 Congressional Budget Request: National Nuclear Security Administration, Office of the Administrator, Weapons Activities, Defense Nuclear Nonproliferation, Naval Reactors*, April 2013, Volume 1, p. 215. <http://energy.gov/sites/prod/files/2013/04/f0/Volume1.pdf> (Downloaded June 3, 2013) (Hereinafter *Department of Energy FY 2014 Congressional Budget Request*)

## **Recommendations:**

1. Given current budget constraints, Congress and DOE should insist on a publicly released independent study that determines secondary component lifetimes and that looks into reducing the scope of Life Extension Programs (LEPs), including the feasibility of focusing on recertification rather than remanufacturing of nuclear bomb secondaries in order to confirm the need for the UPF's planned production capabilities.
2. Congress and DOE should insist on an independent structural analysis of Building 9212 and fully explore the options of using existing facilities at the Pantex Plant and at Y-12, like the HEUMF, to meet credible nuclear modernization requirements and compare those with UPF costs and functionality.
3. Until independent studies confirm what exactly is needed for credible nuclear modernization, the LEPs should not be funded. The Administration and DOE should zero out funding for the W76-1, W88 Alt 370, B61-12, Cruise Missile Warhead, and W77/88-1 Life Extension Programs in the President's budget request beginning with Fiscal Year 2015.
4. Unless independent studies confirm the need for UPF, the United States shouldn't fund it. The Administration and DOE should zero out funding for UPF in the President's budget beginning with Fiscal Year 2015, and Congress should cancel funding in its subsequent appropriations bills until the spending is justified.
5. DOE and NNSA should begin an aggressive downblending program to reduce the country's stockpile of highly enriched uranium that has been declared excess.

## INTRODUCTION

The Uranium Processing Facility (UPF) is intended to replace several uranium operations facilities at the Y-12 National Security Complex in Oak Ridge, Tennessee. The goals of the new processing facility are to consolidate and improve uranium operations and support the nuclear weapons stockpile. Since the project was first sold to Congress in 2005, costs have skyrocketed and delays have extended the estimated completion date by two decades. Meanwhile, hundreds of millions of dollars continue to be poured into supporting existing infrastructure at Y-12. The Project On Government Oversight (POGO) has identified numerous problems that have plagued this project since its inception, as well as several steps that must be taken to thoroughly assess alternatives to this costly facility.

The National Nuclear Security Administration (NNSA), an agency within the Department of Energy (DOE) responsible for the safety and security of the U.S. nuclear weapons stockpile, first proposed construction of the UPF in its Fiscal Year (FY) 2006 budget request to Congress.<sup>2</sup> The new facility is designed to “ensure the long-term viability, safety, and security” of enriched uranium capabilities by replacing several facilities—including the 9215 Complex, Beta 2E, which handles several operations including disassembly and assembly of warheads, and in particular the 9212 Complex (commonly referred to as Building 9212)—and consolidating highly enriched uranium (HEU) operations.<sup>3</sup> These uranium operations include evaluating the quality of weapons in the nuclear stockpile, the disassembly of returned nuclear secondaries, and the assembly of secondaries from refurbished and new components.

As the years have passed, slight but telling adjustments have been made to the UPF’s budget request language, and the project has fallen further and further behind schedule. Even the projected savings have changed.

In the FY 2007 budget request, language carried over from the FY 2006 request for the proposed UPF was changed from replacing “noncompliant facilities” to replacing “marginally compliant facilities,”<sup>4</sup> suggesting that Building 9212 was in better shape than many would be led to believe.

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<sup>2</sup> Department of Energy, Office of Management, Budget and Evaluation/CFO, *Department of Energy FY 2006 Congressional Budget Request: National Nuclear Security Administration, Office of the Administrator, Weapons Activities, Defense Nuclear Nonproliferation, Naval Reactors*, February 2005, Volume 1, pp. 233-235.

<http://energy.gov/sites/prod/files/FY06Volume1.pdf> (Downloaded June 3, 2013)

<sup>3</sup> The Building 9212 Complex contains Buildings 9212, 9818, 9815, 9980, and 9981 where many uranium operations and processing take place. The 9215 Complex (containing Buildings 9215 and 9998), Building 9204-2E (sometimes called Beta 2E), Building 9720-12, Building 9720-5, Building 9995, Building 9201-5W, and Building 9201-5N are all also buildings containing uranium operations at Y-12. The Oak Ridge Environmental Peace Alliance, *The Future of Y12*, November 2009, pp. 3-4. <http://orepa.org/wp-content/uploads/2011/03/Future-of-Y12.pdf> (Downloaded September 4, 2013) (Hereinafter *The Future of Y12*); The Y-12 National Security Complex, “From aging infrastructure to the unaparalleled UPF,”[sic] February 7, 2013.

<http://www.y12.doe.gov/news/report/aging-infrastructure-unaparalleled-upf> (Downloaded September 4, 2013) (Hereinafter “From aging infrastructure to the unaparalleled UPF”)

<sup>4</sup> Department of Energy, Office of Chief Financial Officer, *Department of Energy FY 2007 Congressional Budget Request: National Nuclear Security Administration, Office of the Administrator, Weapons Activities, Defense Nuclear Nonproliferation, Naval Reactors*, February 2006, p. 250.

<http://energy.gov/sites/prod/files/FY07Volume1.pdf> (Downloaded July 23, 2013)

Interestingly, in FY 2011, compliance language was dropped completely. However, NNSA has continued to refer to this facility as “decaying” elsewhere.<sup>5</sup>

Furthermore, a recent Government Accountability Office (GAO) report revealed that between 2011 and 2012 the projected timeline for the UPF was dramatically changed. The planned facility will no longer consolidate all uranium operations immediately. The construction has been broken into three phases, the first of which will replace all Building 9212 capabilities. However, the other two phases, which include construction work to replace other Y-12 buildings containing bomb-grade nuclear material such as the 9215 Complex and Beta 2E, have been deferred and will not be fully complete until 2038 at the earliest.<sup>6</sup> This significantly delays fulfilling the mission of UPF, which was supposed to consolidate and reduce the footprint of all buildings containing HEU at Y-12 for safety and security purposes.

Even the originally projected savings that would result from the facility have changed or disappeared. In FY 2006, NNSA touted a 50 percent decrease in annual operating costs that would result from the UPF. In FY 2008, the projected annual operating cost savings upon completion of UPF dropped to 37 percent.<sup>7</sup> By FY 2011 any language discussing annual operating cost savings in percentages had been replaced with claims of yearly savings “in excess of \$200,000,000,” with no explanation of whether that was less or more than had been expected in FY 2006.<sup>8</sup> And in FY 2012 any mention of specific numbers when discussing reduced annual operating costs was dropped completely.<sup>9</sup> POGO wasn’t able to determine the cause of the changes, but it is something decision-makers should keep in mind when assessing the value of this multi-billion dollar project.

At the same time that justifications for this multi-billion dollar facility have changed and regressed, questions have been raised about the facility’s projected timeline. Even the earliest possible date that UPF could be put into operation is not definite. Independent estimates from the U.S. Army Corps of Engineers say 2023 or 2035, depending on various funding and construction

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<sup>5</sup> National Nuclear Security Administration, “Budget,” <http://www.nnsa.energy.gov/aboutus/budget> (Downloaded September 12, 2013)

<sup>6</sup> Government Accountability Office, *Nuclear Weapons: Factors Leading to Cost Increases with the Uranium Processing Facility*, July 12, 2013, p. 27. <http://www.gao.gov/assets/660/655848.pdf> (Downloaded July 23, 2013) (Hereinafter *Factors Leading to Cost Increases with the Uranium Processing Facility*); Frank Munger, “UPF’s deferred scope,” *Knoxville News Sentinel*, October 13, 2012. <http://blogs.knoxnews.com/munger/2012/10/upfs-deferred-scope.html> (Downloaded September 4, 2013)

<sup>7</sup> Department of Energy, Office of Chief Financial Officer, *Department of Energy FY 2008 Congressional Budget Request: National Nuclear Security Administration, Office of the Administrator, Weapons Activities, Defense Nuclear Nonproliferation, Naval Reactors*, February 2007, Volume 1, p. 228. <http://energy.gov/sites/prod/files/FY10Volume1.pdf> (Downloaded June 3, 2013) (Hereinafter *Department of Energy FY 2008 Congressional Budget Request*)

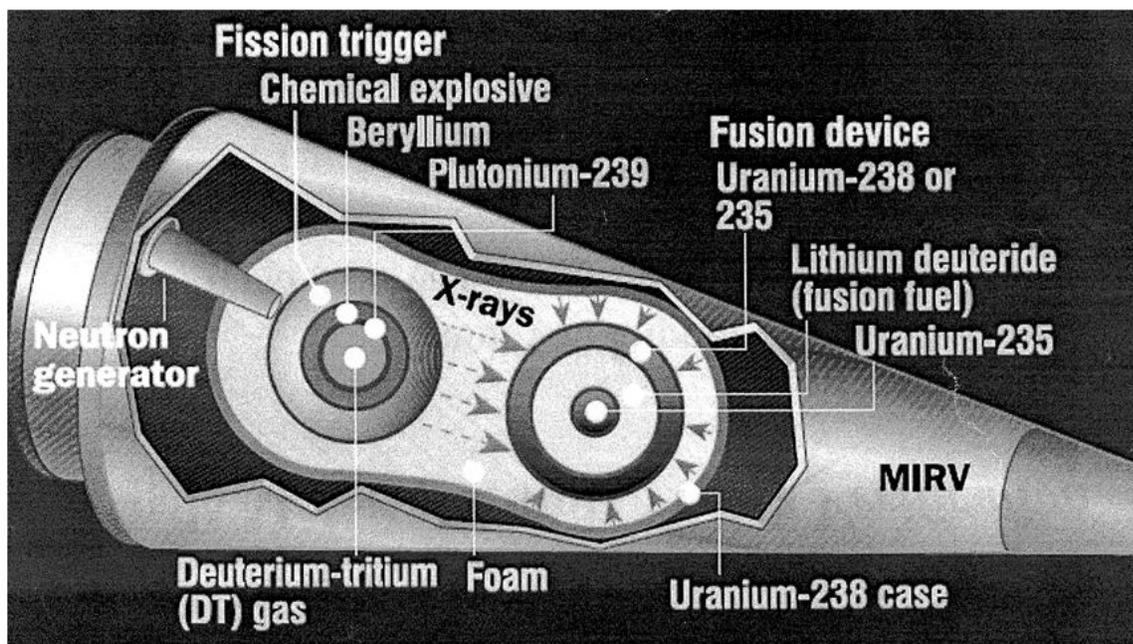
<sup>8</sup> Department of Energy, Office of Chief Financial Officer, *Department of Energy FY 2011 Congressional Budget Request: National Nuclear Security Administration, Office of the Administrator, Weapons Activities, Defense Nuclear Nonproliferation, Naval Reactors*, February 2010, p. 209. <http://energy.gov/sites/prod/files/FY11Volume1.pdf> (Downloaded July 23, 2013) (Hereinafter *Department of Energy FY 2011 Congressional Budget Request*)

<sup>9</sup> Department of Energy, Office of Chief Financial Officer, *Department of Energy FY 2012 Congressional Budget Request: National Nuclear Security Administration, Office of the Administrator, Weapons Activities, Defense Nuclear Nonproliferation, Naval Reactors*, February 2011, Volume 1, p. 187. <http://energy.gov/sites/prod/files/FY12Volume1.pdf> (Downloaded June 3, 2013) (Hereinafter *Department of Energy FY 2012 Congressional Budget Request*)

scenarios; while NNSA insists that some uranium operations could begin by 2025, though the facility would not be fully operational until 2038. This delay will require numerous upgrades to other facilities until UPF could be fully functional.

How will at least a decade of delays affect UPF's contribution to NNSA's overall mission of stockpile stewardship?

### LIFE EXTENSION PROGRAMS—WHAT CAPACITY DO WE NEED?



Source: Frank von Hippel, "Fissile Material Cutoff Treaty Verification," IPFM Panel on Fissile Material Cutoff Issues, September 28, 2006.

One of the primary functions planned for the proposed UPF facility is nuclear warhead Life Extension Programs (LEPs).<sup>10</sup> A LEP is a program designed to replace and repair aging or deteriorating components in nuclear warheads to make sure they meet military requirements. Much of the physical work on the warheads, such as remanufacturing, assembly, and disassembly of certain key HEU components, is currently done at the Y-12 site.<sup>11</sup>

Extending the life of these warheads involves taking them apart, recertifying that the components are still functioning, and, if necessary, remanufacturing any parts that do not meet recertification

<sup>10</sup> Y-12 National Security Complex, "LEP: Extending stockpile life," February 7, 2013.

<http://www.y12.doe.gov/news/report/lep-extending-stockpile-life> (Downloaded September 4, 2013)

<sup>11</sup> National Nuclear Security Administration, "Life Extension Programs."

<http://nnsa.energy.gov/ourmission/managingthestockpile/lifeextensionprograms> (Downloaded July 23, 2013)

standards.<sup>12</sup> The remanufacturing of uranium secondaries, the highly enriched uranium part of the warhead that facilitates a much larger explosion than the plutonium pit alone, is performed at Y-12. This involves shipping these components containing bomb-grade material across the country multiple times.

But there is a great deal of confusion and debate regarding the current and future need to remanufacture uranium secondaries. For years, DOE and NNSA claimed they needed the capacity to remanufacture 160-200 secondaries a year.<sup>13</sup> But DOE's FY 2014 Stockpile Stewardship and Management Plan says that "UPF manufacturing capacity will be at approximately 80 CSAs [Canned Sub-Assemblies] per year when all process operations from 9212 (Phase I), 9215, and 9998 (Phase II, and 9204-2E (Phase III) are fully operational in the UPF." This raises questions about what capability the NNSA truly requires. How was this number determined when just a few years ago it was so much higher, and if 80 is an accurate estimate, do they really need to build a multi-billion dollar facility to meet that need?<sup>14</sup> Regardless, it will be at least a decade before UPF can perform this function and by then the United States' nuclear stockpile will be greatly reduced.

As of 2009, which is the most recent data available, the U.S. stockpile contained 5,113 warheads.<sup>15</sup> In 2010, President Obama signed the New START treaty, which requires Russia and the United States to each reduce their deployed strategic nuclear warheads to 1,550 by 2018.<sup>16</sup> In a recent speech in Berlin, President Obama expressed his commitment to cutting the United States' deployed strategic arsenal by one third, reducing it to 1,000 warheads, if Russia follows suit.<sup>17</sup> NNSA has not disclosed how President Obama's commitment to dramatically reducing the United States' strategic nuclear stockpile will affect LEPs, but it would seem that significantly less capacity will be required in 2038, when UPF is expected to be fully operational.

Fundamentally, the NNSA mission at DOE is one that is losing relevance in today's post-Cold War security environment. Much of NNSA's mission is to support the weapons activities of the United States' nuclear triad, a system of components that include a fleet of Intercontinental Ballistic Missiles, ballistic missile submarines, and long-range nuclear-capable bombers.<sup>18</sup> First

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<sup>12</sup> The MITRE Corporation, *Lifetime Extension Program (LEP) Executive Summary*, September 9, 2009, pp. 2-3. [http://www.armscontrolwonk.com/file\\_download/213/JASON\\_LEP.pdf](http://www.armscontrolwonk.com/file_download/213/JASON_LEP.pdf) (Downloaded July 23, 2013)

<sup>13</sup> Frank Munger, "POGO claims warhead secondaries aren't remanufactured, questions need for UPF; NNSA says that's unfactual, uninformed, ludicrous," *Knoxville News Sentinel*, October 28, 2010. [http://blogs.knoxnews.com/munger/2010/10/pogo\\_says\\_warhead\\_secondaries.html](http://blogs.knoxnews.com/munger/2010/10/pogo_says_warhead_secondaries.html) (Downloaded September 4, 2013) (Hereinafter "POGO claims warhead secondaries aren't remanufactured, questions need for UPF")

<sup>14</sup> Department of Energy, *Fiscal Year 2014 Stockpile Stewardship and Management Plan Report to Congress*, June 2013, p. 5-8-5-9 [http://nnsa.energy.gov/sites/default/files/nnsa/06-13-inlinefiles/FY14SSMP\\_2.pdf](http://nnsa.energy.gov/sites/default/files/nnsa/06-13-inlinefiles/FY14SSMP_2.pdf) (Downloaded September 4, 2013) (Hereinafter *Fiscal Year 2014 Stockpile Stewardship and Management Plan Report to Congress*)

<sup>15</sup> National Nuclear Security Administration, "Weapons," <http://nnsa.energy.gov/ourmission/managingthestockpile/weapons> (Downloaded September 4, 2013)

<sup>16</sup> U.S. Department of State, "New START," <http://www.state.gov/t/avc/newstart/> (Downloaded September 4, 2013)

<sup>17</sup> Peter Baker and David E. Sanger, "Obama Has Plans to Cut U.S. Nuclear Arsenal, if Russia Reciprocates," *The New York Times*, June 18, 2013. [http://www.nytimes.com/2013/06/19/world/obama-has-plans-to-cut-us-nuclear-arsenal-if-russia-reciprocates.html?\\_r=0](http://www.nytimes.com/2013/06/19/world/obama-has-plans-to-cut-us-nuclear-arsenal-if-russia-reciprocates.html?_r=0) (Downloaded September 4, 2013)

<sup>18</sup> John Barry, "Bye-Bye Bomber?" *Newsweek*, December 11, 2009. <http://www.thedailybeast.com/newsweek/2009/12/11/bye-bye-bomber.html> (Downloaded September 24, 2013)

and foremost, President Obama has committed to reducing the number of deployed strategic weapons, which in turn, will likely lead to a reduction in the delivery systems that make up the nuclear triad. Second, under current budget constraints, there are serious questions as to the Air Force's and Navy's ability to develop and procure a new ballistic missile submarine [SSBN(X)] and long-range bomber. For example, recently, the Navy floated the idea of either requesting a \$4 billion annual supplemental to help cover the cost of the new SSBN(X) program or simply removing it from the shipbuilding budget and placing it elsewhere in the Pentagon's budget.<sup>19</sup> The estimated \$4 billion funding shortfall does not take into account the fact that the Congressional Budget Office routinely chastises the Navy for underestimating the costs of its shipbuilding projects.<sup>20</sup> Lastly, many defense experts agree that the United States can safely move from a nuclear triad to a nuclear diad, or even a nuclear monad, in which one or two legs of the current triad are removed. Most recently, analysts at the Cato Institute published a report showing that moving to a submarine-based nuclear monad would save roughly \$20 billion a year while maintaining a robust nuclear deterrent.<sup>21</sup> If the United States does indeed downgrade to a nuclear diad or monad, activities at NNSA that support the Pentagon's nuclear weapons mission can be dramatically scaled back.

### **Life Study for Secondaries**

As various nuclear warheads in our stockpile go through LEPs, the number of uranium secondaries that have required remanufacturing has not been publically released. Before billions of dollars are spent on yet another facility, an independent study should be conducted on secondary lifetimes (how many years secondaries last before deteriorating) to determine what production capabilities are actually required, including how recertification can be prioritized.

POGO has interviewed a number of current and former DOE and NNSA sources, as well as nuclear scientists, to determine how many uranium secondaries have undergone remanufacturing at Y-12 during the LEPs. The response has been inconsistent to say the least, ranging from none to all of them. NNSA claims the issue is highly classified and has called POGO's assertions that the real number of warheads requiring remanufactured secondaries is significantly fewer than 200 per year "ludicrous" and "unfactual."<sup>22</sup> However, trusted DOE sources have told POGO that several hundred warheads have gone through the LEP process and have not required remanufactured secondaries.<sup>23</sup> A few years ago, POGO ran into a similar issue with the proposed construction of the Chemistry and Metallurgy Research Replacement – Nuclear Facility (CMRR-NF) at the Los Alamos National Laboratory. NNSA and DOE initially refused to release the number of plutonium pits that would need to be manufactured at the new \$6 billion CMRR-NF. When they eventually did release the figure, the number plummeted from 450 per year to fewer

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<sup>19</sup> Frank Oliveri, "Is the Price Right for Navy's Sub Replacement Program?" *Roll Call*, September 17, 2013. [http://www.rollcall.com/news/is\\_the\\_price\\_right\\_for\\_navys\\_sub\\_replacement\\_program-227675-1.html?zkPrintable=true](http://www.rollcall.com/news/is_the_price_right_for_navys_sub_replacement_program-227675-1.html?zkPrintable=true) (Downloaded September 24, 2013)

<sup>20</sup> Congressional Budget Office, "An Analysis of the Navy's Fiscal Year 2013 Shipbuilding Plan," July 25, 2012. <http://www.cbo.gov/publication/43468> (Downloaded September 24, 2013)

<sup>21</sup> Benjamin H. Friedman, Christopher A. Preble and Matt Fay, Cato Institute, *The End of Overkill? Reassessing U.S. Nuclear Weapons Policy*, 2013. [http://object.cato.org/sites/cato.org/files/pubs/pdf/the\\_end\\_of\\_overkill\\_wp\\_web.pdf](http://object.cato.org/sites/cato.org/files/pubs/pdf/the_end_of_overkill_wp_web.pdf) (Downloaded September 24, 2013)

<sup>22</sup> "POGO claims warhead secondaries aren't remanufactured, questions need for UPF"

<sup>23</sup> Project On Government Oversight, "Allegation Weakens Case for \$5 Billion Energy Department Facility," October 28, 2010. <http://www.pogo.org/about/press-room/releases/2010/nss-nwc-20101028.html>

than 80, even as costs skyrocketed on the new facility.<sup>24</sup> An analysis performed by the Lawrence Livermore National Laboratory and the Los Alamos National Laboratory found that the lifetime expectancy of these plutonium pits is 150 years, a finding supported by a study performed by an independent group of scientific advisors called JASON.<sup>25</sup> These conclusions raised serious questions about the necessity of the new CMRR-NF. Funding for the facility was deferred for five years in 2012, and it now seems that the interim plan featuring production modules will replace the CMRR-NF indefinitely.<sup>26</sup>

Without an independent and unbiased estimate of the lifetimes of secondaries, there can be no way of knowing if NNSA truly needs to extend the life of 200, 160, or even 80 warhead secondaries per year (either now or starting in 2025, when UPF would most likely become partially operational). It still remains unclear if every single warhead will even need to be extended. Spending \$11.6 billion is too much for a facility with an uncertain mission.

### **Reduced Scope for Life Extension Programs**

In a recent speech at the American Security Project, former NNSA Administrator Linton Brooks voiced his opinion that DOE and NNSA must embrace a reduced scope for warhead LEPs to reflect current budget constraints. If the agencies follow Brooks' advice, that would naturally affect the planned mission capabilities of UPF. According to *The Weapons Complex Monitor*,

Brooks specifically focused on the B61 nuclear bomb refurbishment and NNSA's failure to contain the skyrocketing costs of the program:

These are extraordinarily safe weapons now and you look at the entire system, they're extraordinarily secure so I think that the community is unlikely to spend lots of money to add some more decimal points to safety and security....There is this bias for let's make it as good as we can. I think money is in the process of trumping that big time over the next couple of years.<sup>27</sup>

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<sup>24</sup> Testimony of Philip E. Coyle III, Senior Advisor, World Security Institute, before the House Committee on Appropriations Subcommittee on Energy and Water on "The Future of the DOE Complex Transformation Program," March 17, 2009, p. 195. [http://democrats.appropriations.house.gov/images/stories/pdf/ew/Hearing\\_Volumes/Energy-FY10-Pt6.pdf](http://democrats.appropriations.house.gov/images/stories/pdf/ew/Hearing_Volumes/Energy-FY10-Pt6.pdf); Project On Government Oversight, *U.S. Nuclear Weapons Complex: Energy Department Plans to Waste Billions of Dollars on Unneeded Los Alamos Lab Facility*, January 18, 2012. <http://www.pogo.org/our-work/reports/2012/nss-nwc-20120118-us-nuclear-weapons-complex.html>

<sup>25</sup> Arnie Heller, "Plutonium at 150 Years: Going Strong and Aging Gracefully," *Science and Technology Review*, December 2012. <https://str.llnl.gov/Dec12/chung.html>; R. J. Hemley and D.L. Meiron, *Pit Lifetime*, The MITRE Corporation, November 20, 2006. [http://www.lasg.org/JASONS\\_report\\_pit\\_aging\\_ocr.pdf](http://www.lasg.org/JASONS_report_pit_aging_ocr.pdf) (Downloaded September 4, 2013)

<sup>26</sup> *Department of Energy FY 2014 Congressional Budget Request*, p. 168; Executive Office of the President, Office of Management and Budget, "Statement of Administration Policy: S. 3254 – National Defense Authorization Act for FY 2013," November 29, 2012, pp. 2-3. [http://www.whitehouse.gov/sites/default/files/omb/legislative/sap/112/saps3254s\\_20121129.pdf](http://www.whitehouse.gov/sites/default/files/omb/legislative/sap/112/saps3254s_20121129.pdf) (Downloaded September 4, 2013); Greg Mello, "Latest plan for Los Alamos plutonium facilities involves construction of underground factory 'modules,'" May 7, 2013. [http://www.lasg.org/press/2013/press\\_release\\_7May2013.html](http://www.lasg.org/press/2013/press_release_7May2013.html) (Downloaded September 23, 2013)

<sup>27</sup> Exchange Monitor Publications, "Weapons Complex Morning Briefing," *Nuclear Weapons and Material Monitor* eNewsletter, April 16, 2013.

When a former head of NNSA is pushing for a reduced LEP scope, it should send the message that the agency is looking at a long, tough road ahead where some difficult but necessary decisions will have to be made. It's time to place an emphasis on recertification rather than remanufacturing. Holding on to past Cold War-era practices when taxpayer money flowed freely into nuclear development programs is no longer going to fly considering current fiscal and diplomatic realities.

Furthermore, most warhead LEPs will be complete by the time UPF finally becomes fully operational in 2038. NNSA's FY 2014 Stockpile Stewardship and Management Plan provides insight into the LEP plans for each of the major warhead groups. By 2038 development and production will be complete on LEPs for several warheads: the W76-1, the W88 Alt 370, B61-12, Cruise Missile Warhead, and W77/88-1. Even if the UPF is able to avoid any further schedule delays and begin some uranium operations by 2025, the facility would only be able to contribute to work on the Cruise Missile Warhead and the W77/88-1.<sup>28</sup>

In early 2011, Dr. David Overskei, a nuclear expert and former Chairman of the Secretary of Energy Advisory Board's Nuclear Weapons Complex Infrastructure Task Force, confirmed that LEP work on several warheads would be complete long before UPF could be even partially operational. He also expressed concerns regarding the feasibility of transitioning production from facilities like Building 9212 to UPF:

The [B]61 [nuclear warhead] will go into production and it will finish production around '21-23 or something like that...and the last big system—and this is the system where the DOD is actually interested in truly doing some major changes in the surety and use control—this would be the [W]87/88 [warhead] type combination. That's supposed to go in first production in '21....And if you look at those three systems, they will provide the basis, the cornerstone of our stockpile capability through 2040. And I don't know of the viability of transitioning production from an existing facility of a major element like that into a new facility in the middle of production. I mean, if you talk to industry, they won't do that because that introduces lots of problems. And so in those facilities—and it's not specifically UPF, it's also CMRR because Los Alamos contends they need the CMRR for their pits and pits will become an element of the 87/88. And so it doesn't do a whole lot of good for the country to have a facility that comes online that that [sic] does not get used for the last major system in our existing deterrent.<sup>29</sup>

Ultimately, Dr. Overskei confirmed that he doesn't foresee the UPF "contributing to the mission of the NNSA."<sup>30</sup> Since the LEP is a critical part of the proposed UPF mission, this is a particularly troubling timeline and certainly calls into question the need for such a massive and exorbitantly expensive facility. It seems to POGO that the far more logical and fiscally responsible plan would be to utilize existing facilities. This would cost much less than a brand new building and would provide operational capacity far sooner.

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<sup>28</sup> *Fiscal Year 2014 Stockpile Stewardship and Management Plan Report to Congress*, p. 2-17

<sup>29</sup> Frank Munger, "UPF and LEPs: a case of bad timing?" *Knoxville News Sentinel*, February 27, 2011. <http://blogs.knoxnews.com/munger/2011/02/upf-and-leps-poor-timing.html> (Downloaded July 23, 2013) (Hereinafter "UPF and LEPs: a case of bad timing?")

<sup>30</sup> "UPF and LEPs: a case of bad timing?"

## USING WHAT WE'VE GOT

One of UPF's most important and enduring missions is to recertify uranium secondaries, or Canned Sub-Assemblies, for LEPs. Recertification, sometimes referred to as requalification or reacceptance, involves removing the parts from old nuclear weapons and recertifying that they are still fully functional before putting them in new ones. It seems from a number of government documents, such as the *Pantex Plant FY 2013 Twenty-Five Year Site Plan* and the Final Environmental Impact Statement for the Pantex Plant, that the recertification of these secondaries can be performed at the Pantex Plant in Amarillo, Texas, instead.<sup>31</sup> The Pantex Plant is responsible for the storage, surveillance, and recertification of plutonium pits, stockpile life extension programs, and weapons dismantlement.

POGO has been informed by sources at the plant that Pantex is interested in taking on the recertification of uranium secondaries and has several excess bays and cells where this work could be accomplished. Furthermore some of the equipment used in the recertification of plutonium pits could also be used in certifying HEU secondaries. According to the Final Environmental Impact Statement for the Pantex Plant:

NNSA is considering a work change that would enable the Pantex Plant to perform re-qualification of the Canned Sub-Assembly weapon component rather than sending that component to the Y-12 Plant for re-qualification. Performing this work at the Pantex Plant would reduce the amount of transportation of weapons components between sites. The work also would be very similar to the pit re-qualification work currently performed at the Plant, and would fit well within the Plant's primary mission identified above.<sup>32</sup>

The Twenty-Five Year Pantex Site Plan included similar findings:

Performing CSA [Canned Sub-Assembly] reacceptance at Pantex remains an option for B61 and W78 LEPs based predominately on minimizing cost. When applying non-intrusive processes similar in nature to those used for W76-1 pit requalification, the option offers efficient component recovery and essentially eliminates inter-site transport of large quantities of CSAs during the term of the LEP.<sup>33</sup>

Eliminating the need for the uranium secondaries to be shipped across the country to Y-12 and back again is one of the biggest benefits of transferring this program to the Pantex Plant. The transport is not only expensive, but also leaves sensitive nuclear material and the communities it travels through far more vulnerable to accidents, theft, or attack. If NNSA embraces a reduced scope for LEPs that focuses on recertification, which can be done at Pantex, then existing facilities at Y-12 could be modified or upgraded to take on the rest of UPF's proposed mission, including any required remanufacturing.

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<sup>31</sup> Babcock & Wilcox Technical Services Pantex, LLC, *Pantex Plant FY 2013 Twenty-Five Year Site Plan*, September 20, 2012, p. 23. [http://nnsa.energy.gov/sites/default/files/nnsa/01-13-multiplefiles/2013-01-15%20Pantex%20e466527%20FINAL\\_0.pdf](http://nnsa.energy.gov/sites/default/files/nnsa/01-13-multiplefiles/2013-01-15%20Pantex%20e466527%20FINAL_0.pdf) (Downloaded July 23, 2013) (Hereinafter *Pantex Plant FY 2013 Twenty-Five Year Site Plan*); National Nuclear Security Administration, *Final Supplement Analysis For The Final Environmental Impact Statement For The Continued Operation Of The Pantex Plant And Associated Storage Of Nuclear Weapons Components*, November 2012, p. 5. <http://energy.gov/sites/prod/files/EIS-0225-SA-05-2013.pdf> (Downloaded July 23, 2013) (Hereinafter Final Environmental Impact Statement for the Pantex Plant)

<sup>32</sup> Final Environmental Impact Statement for the Pantex Plant, p. 5

<sup>33</sup> *Pantex Plant FY 2013 Twenty-Five Year Site Plan*, p. 23

## Combine the HEUMF and UPF Facilities

Another alternative to building a new and expensive UPF is to modify and refurbish existing infrastructure at Y-12 to support the uranium missions that Pantex is not capable of handling. The behemoth UPF is actually planned as the companion facility to the Highly Enriched Uranium Materials Facility (HEUMF), a large building completed in 2008 for the storage of HEU. However, according to NNSA sources, that function only takes up 57 percent of the capacity of the new facility. NNSA should investigate whether this free space could be adjusted and augmented for a scaled down, vastly more realistic, UPF mission that reflects the current realities of our nuclear requirements at a fraction of the cost.

Combining functions into one facility is not unprecedented. For example, at Los Alamos National Laboratory, the Plutonium Facility PF-4 stores ten tons of weapons-grade plutonium, houses research and development projects, and houses plutonium pit remanufacturing programs.<sup>34</sup>

The security benefits of such a move must also be considered. It's no secret that Y-12 has had problems defending the complex, and HEUMF in particular. Consolidating HEU operations into fewer buildings will present fewer targets to potential terrorists and therefore fewer facilities to be protected. Security funds could be consolidated to ensure that this facility will be safe and secure in the future without increasing costs.

Furthermore, although some of the HEU stored at HEUMF has been put aside for use in space, in research reactors, and as naval fuel, there is approximately 300 metric tons of excess HEU with no proposed use.<sup>35</sup> That surplus material could be downblended to free up even more space in the refurbished HEUMF.

## Downblending

As we highlighted in our September 2010 report, *U.S. Nuclear Weapons Complex: How the Country Can Profit and Become More Secure by Getting Rid of Its Surplus Weapons-Grade Uranium*, downblending the excess HEU currently stored at Y-12 with no planned future mission should be an immediate priority. The downblending process involves "diluting HEU with depleted, natural, or low enriched uranium (LEU) to produce a substantially larger quantity of LEU." This process makes the HEU unusable in weapons, and therefore unattractive to terrorists or rogue nations, while creating more LEU to be used in nuclear power plants, demand for which will only increase in future years.<sup>36</sup>

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<sup>34</sup> U.S. Department of Energy, Office of the Inspector General, *Mitigation of Natural Disasters at Los Alamos National Laboratory*, June 2013. <http://energy.gov/sites/prod/files/2013/06/f2/OAS-M-13-04.pdf> (Downloaded September 4, 2013)

<sup>35</sup> International Panel on Fissile Materials, "Countries: United States," March 4, 2013. [http://fissilematerials.org/countries/united\\_states.html](http://fissilematerials.org/countries/united_states.html) (Downloaded July 23, 2013)

<sup>36</sup> Project On Government Oversight, *U.S. Nuclear Weapons Complex: How the Country Can Profit and Become More Secure by Getting Rid of Its Surplus Weapons-Grade Uranium*, September 14, 2010, pp. 10-11. <http://www.pogo.org/our-work/reports/2010/nss-nwc-20100914.html> (Hereinafter *How the Country Can Profit and Become More Secure*); Nuclear Energy Agency, "Uranium resources sufficient to meet projected nuclear energy requirements long into the future," June 3, 2008. <http://www.oecd-nea.org/press/2008/2008-02.html> (Downloaded September 4, 2013)

There are so many advantages to downblending the excess HEU stored at Y-12 that it seems remarkable that it is not already a top priority of NNSA and Congress. The first and most important advantage is that downblending HEU into LEU will make the United States, and Y-12 in particular, significantly more secure from terrorist attacks or other state actors seeking nuclear materials. Just last year, an 82-year-old activist demonstrated how vulnerable America's nuclear facilities are when she broke into the Y-12 complex, and the GAO has detailed additional security failures across the nuclear security complex.<sup>37</sup> LEU does not require expensive security systems, as HEU does, because it's not weapons-usable. It's unattractive to terrorists because it contains less than 20 percent U-235, meaning it cannot sustain an explosive nuclear reaction.<sup>38</sup>

Not only will the country's nuclear stockpile become significantly safer and more secure with the downblending of HEU, but under the right circumstances, the sale of LEU could ultimately generate revenue for the United States. In 2010, the amount of HEU that the United States could declare surplus and downblend was worth up to \$23 billion, minus the up-front cost of downblending.<sup>39</sup> It would undoubtedly take some initial increased funding to ramp up the downblending program, but the future benefits in both security and income make this investment worthwhile. Although uranium prices have dropped dramatically since the 2011 Fukushima nuclear disaster in Japan, the LEU could be stored until the market has recovered enough to generate considerable revenue from its sale.<sup>40</sup> LEU is significantly less expensive to store and protect than HEU and the government could develop a plan for when, how, and in what quantity LEU can be released into the market to maximize the revenue generated. Furthermore, Congress has already required the Secretary of Commerce to review the uranium market and the demand for LEU and adjust import limitations accordingly.<sup>41</sup>

Russia is way ahead of the United States in the downblending game. A 1993 agreement with the Russian government led to a partnership in which U.S. nuclear power plants use downblended HEU recycled from dismantled Russian warheads, a program called "Megatons to Megawatts." By the end of 2013, it is expected that the program will have downblended 500 metric tons of HEU—the equivalent of 20,000 nuclear warheads—and generated \$12 billion for Russia.<sup>42</sup> The

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<sup>37</sup> Testimony of Mark Gaffigan, Managing Director, Natural Resources and Environment, Government Accountability Office, before the House Committee on Energy and Commerce, Subcommittee on Oversight and Investigations on "Observations on the National Nuclear Security Administration's Oversight of Safety, Security, and Project Management," September 12, 2012, p. 2. <http://www.gao.gov/assets/600/592772.pdf> (Downloaded July 23, 2013)

<sup>38</sup> *How the Country Can Profit and Become More Secure*; Federation of American Scientists, "Uranium Production." [http://www.fas.org/programs/ssp/nukes/fuelcycle/centrifuges/U\\_production.html](http://www.fas.org/programs/ssp/nukes/fuelcycle/centrifuges/U_production.html) (Downloaded September 4, 2013)

<sup>39</sup> Matthew Bunn, *Expanded and Accelerated HEU Downblending: Designing Options to Serve the Interests of All Parties*, July 17, 2008. <http://belfercenter.ksg.harvard.edu/files/inmm-expanded-blend-down-incentives.pdf> (Downloaded September 4, 2013); *How the Country Can Profit and Become More Secure*

<sup>40</sup> James Regan, "Uranium miners face new hurdles as Fukushima disaster worsens," Reuters.com, August 21, 2013. <http://www.reuters.com/article/2013/08/21/us-australia-uranium-idUSBRE97K09R20130821> (Downloaded September 23, 2013)

<sup>41</sup> 110<sup>th</sup> Congress, "Consolidated Security, Disaster Assistance, and Continuing Appropriations Act, 2009" (H.R. 2638), introduced June 8, 2007, by Representative David Price, p. 77. <http://www.gpo.gov/fdsys/pkg/BILLS-110hr2638enr/pdf/BILLS-110hr2638enr.pdf> (Downloaded September 23, 2013)

<sup>42</sup> United States Enrichment Corporation, "Megatons to Megawatts," 2013. <http://www.usec.com/russian-contracts/megatons-megawatts> (Downloaded July 23, 2013); *How the Country Can Profit and Become More Secure*.

excess HEU currently collecting dust in the only half-full HEUMF could be downblended to *earn* money once the market becomes viable, leaving an existing facility almost empty.

## A VULNERABLE DESIGN

Perhaps the most concerning aspect of the proposed UPF is the fact that the current design is far more expensive and significantly less secure than required. UPF is designed to process HEU, which should mean that the building would be constructed as safely and securely as possible to minimize the risks inherent with handling this dangerous material. POGO has encouraged an underground or bermed design for nuclear facilities, similar to the Device Assembly Facility at the Nevada National Security Site or the Kirtland Underground Munitions Storage Complex at Kirtland Air Force Base in Albuquerque, New Mexico.<sup>43</sup> POGO strongly supported this recommendation when the HEUMF was in the design stage and again when plans were put in place to build UPF. Either of those designs would have presented merely a single exposed target for any potential attacks, instead of the current design for both HEUMF and UPF, which leaves all four sides and a roof vulnerable. This means that significantly more man power will be needed to secure and defend UPF; however, there is no plan to increase the protective forces deployed at Y-12.

DOE's Inspector General (IG) also found an above-ground, or non-berm, design to be wasteful and significantly more vulnerable. In 2004, when Y-12 was in the beginning stages of building the HEUMF, the IG conducted a study on the design of the facility. It referenced an approved berm design plan from 2000, which featured a concrete bunker covered by an earth berm on the top and at three sides, leaving only one side to be protected. But when the contract was given to a new contractor, B&W Y-12, the design was changed to remove the berm on the basis that it would cut down on costs and potential delays. However the IG report found the exact opposite to be true. The non-berm design would have:

- Higher life-cycle costs than the original design;
- Personnel security requirements that would be greater than the berm design; and,
- More complex construction requirements that may add cost and time to the project schedule.<sup>44</sup>

Despite overwhelming evidence against the non-berm, above-ground design, Y-12 went ahead with it for HEUMF<sup>45</sup> and is about to do so again with UPF, even though the protective force has proven that they cannot protect HEUMF. For instance, in late July 2012 Megan Rice, an 82-year-

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<sup>43</sup> Letter from Danielle Brian, Executive Director of the Project On Government Oversight, to the Honorable Samuel W. Bodman, Secretary of Energy, regarding Y-12 security, October 31, 2006. <http://www.pogo.org/our-work/letters/2006/nss-y12-20061031.html>; Testimony of Peter Stockton, Project On Government Oversight, before the House Armed Services Committee, Subcommittee on Strategic Forces regarding "Future Plans on the Nuclear Weapons Complex," April 5, 2006. <http://www.pogo.org/our-work/testimony/2006/nss-nwc-20060405.html>

<sup>44</sup> Department of Energy, Office of Inspector General, *Audit Report: Design of the Uranium Storage Facility at the Y-12 National Security Complex*, March 2004. <http://www.pogoarchives.org/m/hsp/Y12/appendix-K.pdf>

<sup>45</sup> Ronald E. Timm, *Design Analysis of Security for the Y-12 Highly Enriched Uranium Materials Facility in Oak Ridge*, September 2006. <http://www.pogoarchives.org/m/hsp/Y12/appendix-L.pdf>

old nun and activist, Greg Boertje-Obed, a 57-year-old veteran and housepainter, and Michael Walli, a 63-year-old drifter, broke into the Y-12 complex and made it all the way to HEUMF where they protested for twenty minutes before being discovered by a guard.<sup>46</sup> This embarrassing security failure could have had tragic results if the activists had been terrorists or other saboteurs. A DOE IG report released a month after the incident revealed a multitude of operational failures that allowed such an intrusion to go undetected, and confirmed that when the protective force was tested after the break-in, test materials were compromised allowing guards to cheat.<sup>47</sup> Furthermore, less than a year after the break-in, a confused motorist was allowed to drive right into the Y-12 complex without showing any kind of identification or credentials.<sup>48</sup> It is clear that HEUMF requires more robust security measures. If the funds currently devoted to UPF were used to facilitate these security upgrades, and the UPF mission moved to HEUMF and the facilities at Pantex, the entire nuclear complex would become significantly safer and more secure than by simply building yet another vulnerable facility. These kinds of incidents make it clear that Y-12 must prioritize security above all other considerations. Building a giant uranium beacon with a vulnerable design that is significantly more difficult and costly to protect is not the place to start.

### **Design Difficulties**

In early 2011, the Final Environmental Impact Statement for the Y-12 National Security Complex was completed, describing the many different design options for the new UPF.<sup>49</sup> The study laid out every option: from no action at all, to the biggest, costliest UPF building design with all the newest bells and whistles. Of course the final decision was to go with a facility that will likely be larger and more expensive than necessary, the “Capability-sized UPF Alternative.”<sup>50</sup> However, the “No Net Production/Capability-sized UPF Alternative” describes a slightly scaled down UPF with a reduced production level that would reflect the current political need for refurbished secondaries.<sup>51</sup> The “Upgrade in-Place Alternative,” describes a plan where the Building 9212 Complex and the other uranium production facilities would be upgraded and modernized over a ten-year period. Although major investments would still be required, either of these options could still save billions of taxpayer dollars while maintaining a safe and appropriate production capability.

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<sup>46</sup> Dan Zak, “The Prophets of Oak Ridge,” *The Washington Post*, April 30, 2013.

<http://www.washingtonpost.com/sf/style/2013/04/29/the-prophets-of-oak-ridge/> (Downloaded June 3, 2013)

<sup>47</sup> Department of Energy, Office of the Inspector General, *Inquiry into the Security Breach at the National Nuclear Security Administration’s Y-12 National Security Complex*, August 2012. [http://energy.gov/sites/prod/files/IG-0868\\_0.pdf](http://energy.gov/sites/prod/files/IG-0868_0.pdf) (Downloaded September 4, 2013); Department of Energy, Office of the Inspector General, *Review of the Compromise of Security Test Materials at the Y-12 National Security Complex*, October 2012. [http://energy.gov/sites/prod/files/IG-0875\\_2.pdf](http://energy.gov/sites/prod/files/IG-0875_2.pdf) (Downloaded September 4, 2013)

<sup>48</sup> Bob Fowler, “Passing through: Woman motorist breaches Y-12 security,” *Knoxville News Sentinel*, June 8, 2013. <http://www.knoxnews.com/news/2013/jun/08/passing-through-woman-motorist-breaches-y-12/> (Downloaded September 4, 2013)

<sup>49</sup> Department of Energy, National Nuclear Security Administration, Y-12 Site Office, “Chapter 3: Alternatives,” *Final Site-Wide Environmental Impact Statement for the Y-12 National Security Complex*, February 2011. [http://nnsa.energy.gov/sites/default/files/nnsa/inlinefiles/EIS0387\\_Final\\_Vol1\\_Chapter\\_3.pdf](http://nnsa.energy.gov/sites/default/files/nnsa/inlinefiles/EIS0387_Final_Vol1_Chapter_3.pdf) (Downloaded June 3, 2013) (Hereinafter FSWEIS for the Y-12 National Security Complex)

<sup>50</sup> Department of Energy, National Nuclear Security Administration, Record of Decision for the Continued Operation of the Y-12 National Security Complex, July 14, 2011. <http://nnsa.energy.gov/sites/default/files/nnsa/inlinefiles/UPF%20Record%20of%20Decision.pdf> (Downloaded June 3, 2013)

<sup>51</sup> FSWEIS for the Y-12 National Security Complex, pp. 27-28.

In November 2010, GAO released a report on Y-12 and the projected technological capabilities of the UPF. The report highlighted GAO's concerns that the technology needed for UPF will not be completely developed by the time construction begins. Specifically several of the new technological advancements will not reach a developmental stage where it can be assured that they will work as intended by the time construction begins. After construction has started any design alterations due to technology changes will result in even higher costs and the facility will fall further behind schedule. Furthermore, GAO referenced a June 2010 NNSA management review which "also noted that, if some technologies do not work as intended, it is not clear whether the current UPF design can accommodate the only identified alternative—to revert back to existing technologies."<sup>52</sup> This is just one more example of NNSA's ambitions overextending its means, and far too often these ambitions end up costing the taxpayer far more than was originally expected.

### **COSTS GO UP AND UP WHILE COMPLETION DATES CONTINUE TO SLIP**

There are alternative solutions to UPF, which has a laundry list of problems going back to the very first projected costs of the facility. When Congress was first sold on the facility in 2005, it was led to believe the cost would be between \$600 million and \$1 billion.<sup>53</sup> Now, however, the entire project's cost estimate has ballooned by over 980 percent, climbing to between \$6.5 billion and \$11.6 billion.

One of the reasons for the explosion in cost is a major design flaw. The design process alone has already cost \$500 million,<sup>54</sup> and fixing the design flaw will cost an additional \$540 million. The Defense Nuclear Facilities Safety Board discovered in late 2012 that Babcock and Wilcox Y-12 Technical Services, LLC (B&W Y-12), the contractor in charge of the project, did not "adequately manage and integrate the design work subcontracted to four other contractors."<sup>55</sup> As a result of this inadequate management, UPF as designed would not be able to fit the equipment needed to perform its mission—processing bomb-grade uranium.<sup>56</sup> Facility designs will need to be modified, raising the ceiling by 13 feet and thickening the walls and concrete foundation accordingly.<sup>57</sup> These fixes burned through 45 percent of the contingency funds built into the \$6.5 billion budget, and GAO has expressed concerns that costs will likely far surpass current

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<sup>52</sup> Government Accountability Office, *National Nuclear Security Administration's Plans for Its Uranium Processing Facility Should Better Reflect Funding Estimates and Technology Readiness*, November 2010, p. 18. <http://www.gao.gov/new.items/d11103.pdf> (Downloaded June 3, 2013)

<sup>53</sup> Department of Energy, Office of Management, Budget and Evaluation/CFO, *Department of Energy FY 2006 Congressional Budget Request: National Nuclear Security Administration, Office of the Administrator, Weapons Activities, Defense Nuclear Nonproliferation, Naval Reactors*, February 2005, Volume 1, p. 233. <http://energy.gov/sites/prod/files/FY06Volume1.pdf> (Downloaded June 3, 2013)

<sup>54</sup> Frank Munger, "UPF math," *Knoxville News Sentinel*, October 28, 2012. <http://blogs.knoxnews.com/munger/2012/10/upf-math.html#more> (Downloaded July 23, 2013)

<sup>55</sup> *Factors Leading to Cost Increases with the Uranium Processing Facility*, p. 28.

<sup>56</sup> *Factors Leading to Cost Increases with the Uranium Processing Facility*, p. 28.

<sup>57</sup> Frank Munger, "UPF to be redesigned because equipment won't fit; \$500M already spent on Y-12 project," *Knoxville News Sentinel*, October 2, 2012. <http://blogs.knoxnews.com/munger/2012/10/upf-to-be-redesigned-because-e.html> (Downloaded September 4, 2013)

estimates.<sup>58</sup> The space/fit issue also caused an additional schedule delay of over a year.<sup>59</sup> This massive blunder and the resulting costs will ultimately fall on the shoulders of the taxpayers.

Frank Munger of the *Knoxville News Sentinel* obtained a copy of a report from the Parsons Infrastructure and Technology Group, Inc. (Parsons), a construction management services contractor for NNSA, which provides a damning look into this design flaw and the environment surrounding the UPF project that allowed it to occur.<sup>60</sup> According to Munger, the Parsons report detailed a “chilled work environment” that discouraged workers from expressing design concerns as well as limiting innovation and communication. This report also offered confirmation of long-held POGO suspicions that NNSA purposefully keeps cost estimates unrealistically low in order to receive taxpayer funds for expensive projects. The Parsons report noted, according to Munger: **“Early estimates [from 2008-2009], which showed the need for a higher cost range, were apparently disregarded to gain approval to proceed with the project. [emphasis added]”**<sup>61</sup> It is these kinds of slippery salesman tactics that make POGO and others question NNSA assertions that they require a new UPF.

In addition to this design mistake, initial incorrect UPF cost estimates were based on vastly underestimated cost assessments for the HEUMF.<sup>62</sup> Originally, the designs for the two facilities were expected to be similar, but because the processing capabilities needed for UPF are far more complicated than those needed for storage at HEUMF, the cost for design, technologies, and construction will be significantly more expensive.<sup>63</sup> Furthermore, NNSA’s revised cost estimates did not account for budget constraints.<sup>64</sup>

Although DOE has kept the official cost estimate for UPF at between \$4.2 and \$6.5 billion, in 2011, the Army Corps of Engineers provided independent cost estimates and operational start dates for two funding scenarios for the UPF facility. In the first scenario, if annual appropriations are *not* subject to budget constraints, the Army Corps estimated the facility will require \$6.5 to \$7.5 billion and could begin operations in FY 2023. However, guidelines issued by NNSA in February 2011 limited UPF funding to between \$200 and \$500 million annually. Thus, in the second scenario, the Army Corps estimated that the facility would cost between \$10.3 and \$11.6 billion and begin operations in FY 2035.<sup>65</sup> In response to these estimates, DOE has deferred some of the UPF’s planned scope.<sup>66</sup>

Just as with so many other NNSA projects that came before it, UPF’s projected completion date continues to be pushed further and further back. Originally, the facility was expected to be

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<sup>58</sup> *Factors Leading to Cost Increases with the Uranium Processing Facility*, pp. 29-30.

<sup>59</sup> *Factors Leading to Cost Increases with the Uranium Processing Facility*, p. 28.

<sup>60</sup> Frank Munger, “UPF review cites ‘chilled work environment,’ other causes for design failure; Y-12’s M&O contractor criticized,” *Knoxville News Sentinel*, September 15, 2013. (Downloaded September 23, 2013) (Hereinafter “UPF review cites ‘chilled work environment,’ other causes for design failure”)

<sup>61</sup> “UPF review cites ‘chilled work environment,’ other causes for design failure.”

<sup>62</sup> *Factors Leading to Cost Increases with the Uranium Processing Facility*, p. 20-21.

<sup>63</sup> *Factors Leading to Cost Increases with the Uranium Processing Facility*, p. 20-21.

<sup>64</sup> *Factors Leading to Cost Increases with the Uranium Processing Facility*, p. 2.

<sup>65</sup> *Factors Leading to Cost Increases with the Uranium Processing Facility*, pp. 24-25.

<sup>66</sup> *Factors Leading to Cost Increases with the Uranium Processing Facility*, p. 27.

completed and operational by 2018.<sup>67</sup> Currently uranium processing capabilities are expected to be operational by 2023 at the earliest, though the second scenario outlined by the Army Corps of Engineers places the completion date more than a full decade later.<sup>68</sup> The 2012 Performance Evaluation Report for B&W Y-12 revealed that “the project has not been able to meet key project milestones and has been late in identifying that project schedule milestones would not be achieved.”<sup>69</sup> This news is troubling so early in UPF’s timeline and does not inspire confidence in B&W Y-12’s ability to remain on the new schedule going forward. Indeed NNSA’s FY 2014 Stockpile Stewardship and Management Plan, released only a few weeks after the GAO publically used the Army Corps of Engineers estimate, confirmed that the fully completed UPF is not expected to be operational until 2038.<sup>70</sup>

Yet even this is not the final cost and schedule estimate for UPF. NNSA spokesman Steven Wyatt confirmed to Frank Munger of the *Knoxville News Sentinel* that the formal baseline will only be refined when the design is 90 percent completed, which is estimated to occur in mid-2014.<sup>71</sup> NNSA should not insist that this is a point of no return. Although the UPF project should be canceled long before then, it is not unusual for NNSA and DOE to cancel or suspend multi-billion dollar projects when it becomes clear they are unnecessary even long after construction has begun.

NNSA and DOE have a long history of mismanaging major construction projects, and this isn’t any different—and may even be worse. The National Ignition Facility at Lawrence Livermore National Laboratory, for example, was originally supposed to cost taxpayers \$1.1 billion but when the facility was finally completed in 2009, the whole project cost almost \$6 billion.<sup>72</sup> Unfortunately, the facility does not yet work, so its price tag has continued to climb to almost \$7.5 billion, with approximately \$400 million still being appropriated annually.<sup>73</sup> The cost of the

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<sup>67</sup> National Nuclear Security Administration, “Major Relocation of Highly Enriched Uranium Completed at Y-12 National Security Complex,” October 2, 2006. <http://nnsa.energy.gov/mediaroom/pressreleases/major-relocation-highly-enriched-uranium-completed-y-12-national-security-co> (Downloaded September 4, 2013)

<sup>68</sup> *Fiscal Year 2014 Stockpile Stewardship and Management Plan Report to Congress; Factors Leading to Cost Increases with the Uranium Processing Facility*, p. 25.

<sup>69</sup> National Nuclear Security Administration, *Performance Evaluation Report for Babcock and Wilcox Y-12 Technical Services, LLC*, p. 7. [http://www.pogoarchives.org/m/nss/nnsa\\_per\\_20120930.pdf](http://www.pogoarchives.org/m/nss/nnsa_per_20120930.pdf)

<sup>70</sup> The strategy outlined in the FY 2014 Stockpile Stewardship and Management Plan breaks the UPF project into three phases: “Phase I consists of construction of the building structure, all associated support facilities, infrastructure, and utilities as well as the prioritization and equipment installation in the new [UPF] of the highly enriched uranium processing currently performed in Building 9212. Phase II involves the highly enriched uranium metal working, machining, and inspection processes that are conducted in Buildings 9215 and 9998. Phase III involves the processes associated with Building 9204-2E (e.g. radiography, assembly and disassembly, quality evaluation, and production certification for weapons secondaries). Highly enriched uranium processing in 9204-2E, 9215, and 9998 will continue until those processes have been transitioned and are fully operational in the [UPF].” *Fiscal Year 2014 Stockpile Stewardship and Management Plan Report to Congress*, p. 5-19.

<sup>71</sup> Frank Munger, “Feds confirm slowdown on UPF, raising questions about cost, safety,” *Knoxville News Sentinel*, July 13, 2013. <http://www.knoxnews.com/news/2013/jul/13/feds-confirm-slowdown-on-upf-raising-questions/> (Downloaded July 23, 2013); *Factors Leading to Cost Increases with the Uranium Processing Facility*, p. 30.

<sup>72</sup> Ingrid Drake, “GAO Report Takes Some Wind Out of NIF Hype,” April 8, 2010. <http://www.pogo.org/blog/2010/04/gao-report-takes-some-wind.html>

<sup>73</sup> Daniel Clery, “NIF Report Asks for More Time to Achieve Ignition,” *Sciencemag.org*, Vol. 338, December 21, 2012. <http://www.trivalleycares.org/new/Sciencemag-NIFarticle-12-12.pdf> (Downloaded September 19, 2013)

CMRR climbed from \$375 million in 2001 to between \$3.7 and \$5.9 billion in 2011,<sup>74</sup> and the Mixed Oxide Fuel Fabrication Facility at Savannah River Site jumped from \$1.6 billion in 2003 to the current estimate of \$7.7 billion.<sup>75</sup>

POGO has learned that because of their long history of mismanaging nuclear construction projects, NNSA leadership has been asked to meet regularly with Members of Congress and their staff, who are conducting direct congressional oversight of the UPF project. Chairman Dianne Feinstein (D-CA) and Ranking Member Lamar Alexander (R-TN) of the Senate Appropriations Subcommittee on Energy and Water Development and the professional staff have been meeting every few months with NNSA and UPF leadership and with project managers in order to ensure that there are no more costly mistakes on this project. Although it is almost laughable that NNSA's failures have led to what is essentially project management by Congress, POGO is pleased to see this kind of leadership on oversight. Clearly a watchful eye is needed to address NNSA's systematic problems with cost growth and slipped deadlines.

### **Building 9212 Maintenance and Upgrade Costs**

Building 9212 currently houses many of the uranium operations at Y-12, including casting of HEU metal and the recovery and processing of HEU for storage.<sup>76</sup> Since FY 2004, hundreds of millions of dollars have been poured into maintenance and upgrades for the facilities at Y-12, particularly Building 9212, yet DOE is still claiming a new facility is the only path forward.

In 2012, NNSA released pictures of Building 9212 to then-Representative Edward Markey (D-MA) that depicted the facility's decrepit state. But the Oak Ridge Environmental Peace Alliance estimated that even considering the cost of labor, unforeseen snags, and the highest possible estimates to fix the pictured problems, the cost would still be substantially lower than \$6.5 billion dollars, the low-end cost estimate for UPF.<sup>77</sup> Furthermore, DOE and NNSA have estimated that it would take between approximately \$80 million and \$120 million in "seismic, ventilation, and other upgrades" to keep the building operating.<sup>78</sup> These numbers are from 2009 so Congress should insist on an updated estimate to determine if the cost of upgrading the facility to modern standards would still be significantly less expensive than a new UPF, particularly because so much money has already been spent on Building 9212.

A POGO analysis of DOE budget requests from FY 2002-FY 2014 found that \$1.3 billion was provided to Y-12 for maintenance on its facilities, including Building 9212 and other facilities from FY 2004-FY 2009, \$230 million was allocated for upgrades at Building 9212 alone in FY 2010, and just over \$65 million from FY 2010-FY 2013 was spent on the Nuclear Facility Risk

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<sup>74</sup> Andre Francisco, "Infographic: The Explosive Costs of CMRR-NF, Los Alamos' Billion Dollar Nuke Facility," February 7, 2012. <http://www.pogo.org/blog/2012/02/los-alamos-economics-at-cmrr.html>

<sup>75</sup> Lydia Dennett, "MOX Costs Spiral Further Out of Control," April 9, 2013.

<http://www.pogo.org/blog/2013/04/20130409-mox-costs-spiral-further-out-of-control.html>

<sup>76</sup> *Department of Energy FY 2014 Congressional Budget Request*, p. 215.

<sup>77</sup> Oak Ridge Environmental Peace Alliance, "Congressman Throws Down the Gauntlet: See for yourself!" February 20, 2012. <http://orepa.org/congressman-throws-down-the-gauntlet-see-for-yourself/> (Downloaded September 17, 2013)

<sup>78</sup> Letter from Katherine Fuchs, Program Director Alliance for Nuclear Accountability, et al. to Senator Carl Levin, regarding the Uranium Processing Facility, October 12, 2012. <http://blogs.knoxnews.com/munger/upfletter.pdf> (Downloaded September 4, 2013); *The Future of Y12*, p. 4.

Reduction program at Y-12, which was responsible for updating infrastructure at Building 9212 and Beta 2E.<sup>79</sup>

The amount of money devoted to upgrades for Building 9212 would seem to suggest that it should not be in as derelict a state as Congress and the public have been led to believe. Indeed even DOE seems confused about the condition of Building 9212. The Y-12 website quotes John Gertsen, Vice President of Uranium Processing Facility Programs saying, “It will be difficult to maintain reliable operations [in Building 9212] past 2021.”<sup>80</sup> The new UPF wouldn’t be online until 2025 at the earliest, which leaves a four-year gap for which DOE doesn’t seem to have a plan. On the other hand, the Defense Nuclear Facilities Safety Board found in mid-2012 that “The CSOOT [Continued Safe Operating Oversight Team] did not identify any safety issues or concerns that would currently provide reason for limiting 9212 operations.”<sup>81</sup>

Indeed, POGO is not the only group to raise a restored Building 9212 as an alternative option to a new UPF. Jay Coghlan of Nuclear Watch New Mexico submitted comments to the Final Environmental Impact Statement for the Y-12 National Security Complex in 2010, saying:

Even in the event that rebuilt secondaries are necessary, NNSA needs to answer the question why a multi-billion dollar Uranium Processing Facility is necessary. Why can’t the existing 9212 complex be sufficiently restored and/or upgraded, and related or not why can’t some floor space be made available in the new ~\$700 million HEU Materials Facility for necessary residual secondary components production?<sup>82</sup>

DOE’s response to this comment merely reiterated the need for a new UPF and failed to consider using both free space in HEUMF and refurbishing Building 9212 to complete the missions of UPF. A combination of these steps could provide a faster and cheaper option than a new UPF.<sup>83</sup>

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<sup>79</sup> *Department of Energy FY 2006 Congressional Budget Request*, p. 212; *Department of Energy FY 2008 Congressional Budget Request*, p. 228; Department of Energy, Office of Chief Financial Officer, *Department of Energy FY 2010 Congressional Budget Request: National Nuclear Security Administration, Office of the Administrator, Weapons Activities, Defense Nuclear Nonproliferation, Naval Reactors*, May 2009, Volume 1, pp. 167, 180. <http://energy.gov/sites/prod/files/FY10Volume1.pdf> (Downloaded June 3, 2013); *Department of Energy FY 2011 Congressional Budget Request*, pp. 56, 163, 172; *Department of Energy FY 2012 Congressional Budget Request*, p. 187; Department of Energy, Office of Chief Financial Officer, *Department of Energy FY 2013 Congressional Budget Request: National Nuclear Security Administration, Office of the Administrator, Weapons Activities, Defense Nuclear Nonproliferation, Naval Reactors*, February 2012, Volume 1, p. 188. <http://energy.gov/sites/prod/files/FY13Volume1.pdf> (Downloaded June 3, 2013); *Department of Energy FY 2014 Congressional Budget Request*, p. 270.

<sup>80</sup> “From aging infrastructure to the unaparalleled UPF.”

<sup>81</sup> Memorandum from Rory Rauch and David Kupferer, Site Representatives, to Timothy Dwyer, Technical Director, Defense Nuclear Facilities Safety Board, regarding Building 9212, 2012. [http://www.dnfsb.gov/sites/default/files/Board%20Activities/Reports/Site%20Rep%20Weekly%20Reports/Y-12%20National%20Security%20Complex%20%20Oak%20Ridge%20National%20Laboratory/2012/wr\\_20120720\\_35.pdf](http://www.dnfsb.gov/sites/default/files/Board%20Activities/Reports/Site%20Rep%20Weekly%20Reports/Y-12%20National%20Security%20Complex%20%20Oak%20Ridge%20National%20Laboratory/2012/wr_20120720_35.pdf) (Downloaded September 24, 2013)

<sup>82</sup> Letter from Jay Coghlan, Executive Director, Nuclear Watch New Mexico, to Pam Gorman, Y-12 SWEIS Document Manager, regarding Y-12 SWEIS, January 30, 2010, p. 2-41. [http://nnsa.energy.gov/sites/default/files/nnsa/inlinefiles/EIS0387\\_Final\\_Vol2\\_Chapter\\_2new.pdf](http://nnsa.energy.gov/sites/default/files/nnsa/inlinefiles/EIS0387_Final_Vol2_Chapter_2new.pdf) (Downloaded September 24, 2013)

<sup>83</sup> Department of Energy, National Nuclear Security Administration, Y-12 Site Office, “Comment Response Document, Chapter 3: Comment Summaries and Responses,” *Final Site-Wide Environmental Impact Statement for the Y-12 National Security Complex*, February 2011.

Congress should insist on an independent structural analysis of the facility to determine the amount of money NNSA would require to completely fix and upgrade Building 9212 to modern requirements. Although determining the exact amount spent on Building 9212 throughout the years was made difficult by budget request formatting changes between years and less-than-exact numbers for the amount specifically spent on the Building 9212 Complex, it's clear that hundreds of millions have already been dispensed to fix the problems at Building 9212 and other uranium operations facilities at Y-12. Furthermore the "Upgrade in-Place Alternative," outlined in the Final Environmental Impact Statement for the Y-12 National Security Complex could be revisited as an option now that UPF has fallen so far behind schedule and has increased so exponentially in cost. At a time when budgets are being slashed at every turn, NNSA cannot afford fail to explore every available option for saving money on a construction project that is already in danger of becoming a sink hole for taxpayer dollars.

### **Sunk Costs**

The \$500 million already poured into the design of UPF provides no reason to keep this costly and unnecessary facility alive.<sup>84</sup> Congress has a long history of cutting funding to DOE projects that have skyrocketing overruns and sunk costs:

- Congress canceled the Clinch River Breeder Reactor in 1983 after its cost estimate ballooned from \$500 million to \$4 billion, despite the \$1.7 billion that had already been spent on the project.
- In 1985, Congress canceled a Gas Centrifuge Enrichment Plant after demand for the project's product significantly decreased. The estimated cost of the project had nearly doubled to \$8.6 billion, and \$3 billion had already been spent.
- In 1993, Congress canceled the New Production Reactor at Savannah River Site after spending \$1.3 billion on the project, which never even had a total cost estimate. The Department of Energy had reported that the United States already had sufficient reserves of the plutonium the reactor was meant to produce.
- And in 1994, after already spending \$2.1 billion, Congress canceled the Superconducting Super Collider, a mammoth particle accelerator, whose cost estimate had jumped from \$5.9 billion up to an astounding \$8.3 billion.<sup>85</sup>

It is neither unreasonable nor unheard of for projects to get the axe when it becomes clear that the mission concepts do not meet price tag realities. It is unreasonable to continue to ask the taxpayers to fund the biggest and most extravagant options for facilities that are not even needed in the first place.

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[http://nnsa.energy.gov/sites/default/files/nnsa/inlinefiles/EIS0387\\_Final\\_Vol2\\_Chapter\\_3.pdf](http://nnsa.energy.gov/sites/default/files/nnsa/inlinefiles/EIS0387_Final_Vol2_Chapter_3.pdf) (Downloaded September 24, 2013)

<sup>84</sup> Frank Munger, "First contracts awarded for site work on UPF project," *Knoxville News Sentinel*, March 22, 2013. <http://www.knoxnews.com/news/2013/mar/22/first-contracts-awarded-for-site-work-on-upf/> (Downloaded September 4, 2013)

<sup>85</sup> President's Commission to Study Capital Budgeting, *Budgeting for Investments in New Facilities for the Department of Energy*, June 19, 1998. [http://clinton3.nara.gov/pcscb/rmo\\_energy.html](http://clinton3.nara.gov/pcscb/rmo_energy.html) (Downloaded September 4, 2013); Peter Stockton, *MOX: The Nuclear Bridge to Nowhere*. <http://ananuclear.org/Portals/0/MOX%20panel.pdf> (Downloaded July 23, 2013)

## CONCLUSION

As the road to a completed UPF becomes longer and more fraught with expensive difficulties, it is ludicrous to continue to ignore the cost-saving alternatives that exist at Y-12 and Pantex. Not to mention the numerous safety and security concerns that are raised by the current UPF plan and design. Before asking taxpayers to fund yet another overly ambitious nuclear facility, it is critical that NNSA publically reveal exactly what capacity will be required and on what timeline. Before billions of dollars are spent on design changes, construction delays, and expensive technologies, NNSA must provide a more full picture of the alternative options available. Ramping up the downblending program, exploring the capabilities of the Pantex site and a modified HEUMF, and requiring an independent structural analysis of Building 9212 will open up faster and more cost-effective options than yet another over-budget NNSA construction project.

## RECOMMENDATIONS

It is POGO's recommendation that the DOE and NNSA take a long look at the design for UPF, its mission, and the future of nuclear weapons in a post-Cold War world. Then examine the alternatives and steps that must be completed before a multi-billion dollar facility is constructed.

1. Given current budget constraints, Congress and DOE should insist on a publicly released independent study that determines secondary component lifetimes and that looks into reducing the scope of Life Extension Programs (LEPs), including the feasibility of focusing on recertification rather than remanufacturing of nuclear bomb secondaries in order to confirm the need for the UPF's planned production capabilities.
2. Congress and DOE should insist on an independent structural analysis of Building 9212 and fully explore the options of using existing facilities at the Pantex Plant and at Y-12, like the HEUMF, to meet credible nuclear modernization requirements and compare those with UPF costs and functionality.
3. Until independent studies confirm what exactly is needed for credible nuclear modernization, the LEPs should not be funded. The Administration and DOE should zero out funding for the W76-1, W88 Alt 370, B61-12, Cruise Missile Warhead, and W77/88-1 Life Extension Programs in the President's budget request beginning with Fiscal Year 2015.
4. Unless independent studies confirm the need for UPF, the United States shouldn't fund it. The Administration and DOE should zero out funding for UPF in the President's budget beginning with Fiscal Year 2015, and Congress should cancel funding in its subsequent appropriations bills until the spending is justified.
5. DOE and NNSA should begin an aggressive downblending program to reduce the country's stockpile of highly enriched uranium that could be declared excess.

## ACRONYMS AND GLOSSARY

<b>B&amp;W Y-12</b>	Babcock and Wilcox Y-12 Technical Services, LLC
<b>CMRR-NF</b>	Chemistry and Metallurgy Research Replacement–Nuclear Facility
<b>DOE</b>	Department of Energy
<b>FY</b>	Fiscal Year
<b>GAO</b>	Government Accountability Office
<b>HEU</b>	Highly Enriched Uranium
<b>HEUMF</b>	Highly Enriched Uranium Materials Facility
<b>IG</b>	Inspector General
<b>LEP</b>	Life Extension Program
<b>LEU</b>	Low Enriched Uranium
<b>NNSA</b>	National Nuclear Security Administration
<b>POGO</b>	Project On Government Oversight
<b>SRS</b>	Savannah River Site
<b>UPF</b>	Uranium Processing Facility

Babcock and Wilcox Y-12 Technical Services, LLC – The contractor in charge of building the UPF.

Beta 2E (Building 9404-2E) – A uranium operations building at the Y-12 Complex. This facility handles the assembly and disassembly of weapons components, quality certification of components, and storage of retired components.

Building 9212 – A uranium operations complex at Y-12 that refers to buildings 9212, 9818, 9815, 9980 and 9981. The processing performed here include casting and evaluating HEU metal for weapons, downblending, as well as the recovery and processing of HEU.

Canned Sub-Assemblies – Also known as “secondaries,” this component of a nuclear warhead contains highly enriched uranium and facilitates the fusion reaction in a thermonuclear bomb.

Downblending – The downblending process involves “diluting HEU with depleted, natural, or low enriched uranium (LEU) to produce a substantially larger quantity of LEU.” This process makes the HEU unusable in weapons, and therefore unattractive to terrorists, while creating more LEU to be used in nuclear power plants, demand for which will only increase.

JASON – A highly respected, independent group of scientists that advises the U.S. government on matters of science and technology. This group discovered that the lifetime expectancy of plutonium pits is 150 years.

Life Extension Program (LEP) – According to the National Nuclear Security Administration, the Life Extension Program is “a systematic approach that consists of a coordinated effort by the design laboratories and production facilities to: 1) determine which components will need refurbishing to extend each weapon’s life; 2) design and produce the necessary refurbished components; 3) install the components in the weapons; and 4) certify that the changes do not adversely affect the safety and reliability of the weapon.”

Los Alamos National Laboratory – A nuclear weapons facility located in Los Alamos, New Mexico. The site of the proposed Chemistry and Metallurgy Research Replacement—Nuclear Facility.

New START – The arms control treaty with Russia to reduce the number of deployed strategic warheads to 1,550 for each side.

Pantex – The Pantex Plant in Amarillo, Texas. A nuclear weapons facility responsible for the assembly and disassembly of nuclear weapons.

Recertification – A process involving taking apart nuclear warheads and determining that their components still meet military requirements.

Uranium Processing Facility – A proposed facility at the Department of Energy’s Y-12 National Security Complex in Oak Ridge, Tennessee that would provide uranium feedstock for use by the NNSA’s Naval Reactors Program to design and develop naval nuclear propulsion plants, the disassembly of nuclear bomb secondaries, and the assembly of new secondaries.

Y-12 – The Y-12 National Security Complex in Oak Ridge, Tennessee, where the Uranium Processing Facility is planned to be constructed.