

# ENHANCING NUCLEAR WEAPONS RESEARCH AND PRODUCTION TO SUPPORT DISARMAMENT?

AN ANALYSIS OF THE U.S. DEPARTMENT OF ENERGY'S NATIONAL NUCLEAR SECURITY  
ADMINISTRATION FISCAL YEAR 2011 BUDGET REQUEST FOR NUCLEAR WEAPONS ACTIVITIES

**Prepared by:** Dr. Robert Civiak, physicist, former Program Examiner for DOE nuclear security activities at the White House Office of Management and Budget

**Prepared for:** Tri-Valley CAREs (Communities Against a Radioactive Environment), Livermore, CA.

**Prepared on:** February 22, 2010

On February 1, 2010, President Obama sent to Congress the first comprehensive budget prepared by his Administration. On the same day, the Department of Energy (DOE) released details about its budget request, including the budget for the National Nuclear Security Administration (NNSA), a semi-independent agency within DOE that, among other missions, is responsible for the maintenance of the U.S. nuclear weapons stockpile. The Budget requests a whopping 13 percent increase for the NNSA. The largest increase, 26 percent, is designated for the non-proliferation programs within the NNSA, many of which directly support the vision of a world without nuclear weapons that the President enunciated in Prague last April. Surprisingly, the 2011 Budget also requests a 14 percent increase in comparable programs to 2010 for NNSA's [Nuclear] Weapons Activities. The total includes large increases for research and development in nuclear weapons science and technology and to build new infrastructure for the production of plutonium and highly enriched uranium parts for nuclear weapons.

Increasing funds for nuclear weapons appears to conflict with a vision of a world without them. The Administration claims that the upgrades are needed to preserve the safety and reliability of the U.S. stockpile until all nuclear weapons can be eliminated. However, many of the increases are inconsistent with expected reductions in the number of nuclear weapons and others support capabilities to modify and enhance nuclear weapons, which are not needed.

It is now up to the Congress to review and make changes to the Budget as it passes appropriation bills for the next 2011 fiscal year, which begins on October 1, 2010. This report highlights key aspects of the Administration's budget request for Weapons Activities. It concludes with recommendations to Congress for savings in the budget that would not sacrifice the safety or reliability of the stockpile.

## Notes and Observations

### Top Line

- The Budget requests \$7.009 billion (B) for the [Nuclear] Weapons Activities of the NNSA. That is an increase of \$624 million (M), or 9.8 percent, above the 2010 appropriation.
- The Budget requests an additional \$273 M in the Nuclear Non-Proliferation (NNP) Account for programs that were funded within Weapons Activities in 2010. NNSA is requesting \$80 M in construction funds and \$113 M in operating expenses for a Pit Disassembly and Conversion Facility within NNP and another \$80 M for preparation and transport of initial quantities of plutonium for disposition, including operation of the Advanced Recovery and Integrated Extraction System (ARIES) facility at Los Alamos. **After correcting for those organizational shifts, the increase in weapons activities compared to comparable activities in 2010 is about \$900 M or 14 percent.**
- The 2011 request is the largest ever for Weapons Activities. Even after accounting for inflation and ignoring the organizational shifts, the \$7 B request for Weapons Activities is 40% larger than the \$5 B/yr (in 2011 dollars) spent on similar activities at the height of the Cold War in the 1970s and 80s.

## Administration Rationale for the Increase

- According to the DOE Budget Highlights, “This increase ... strengthens the science, technology and engineering base, modernizes key nuclear facilities, and streamlines the enterprise’s physical and operational footprint. ... This improved NNSA capability base will mitigate the concerns regarding ratification of the follow-on Strategic Arms Reduction Treaty and the Comprehensive Test Ban Treaty.” The last sentence is revealing. It suggests that the Administration is requesting large increases in the nuclear weapons budget in an attempt to gain support from conservatives for its broader goals in nuclear arms control.
- The Budget states, “The President’s Request provides funding necessary to protect and advance the scientific capabilities at the U.S. national security laboratories — **including the ability to design nuclear warheads** [emphasis added]” Elsewhere it notes, “The Budget request will ... ensure that capabilities and capacity are available so that future warhead life extension programs will allow for increased margin and enhanced warhead safety, security and control.” Designing and fabricating new warheads with increased margins and enhanced properties were the goals of the “Reliable Replacement Warhead” (RRW) program, which was soundly rejected by the Congress. The Budget request reveals that the Obama Administration plans to incorporate the weapons modifications, which were planned under the RRW program, into the existing “Life Extension Program.” That program was established to refurbish warheads, without modifying nuclear components or adding new capabilities, but it is now morphing into a full-fledged effort to redesign and upgrade U.S. nuclear weapons.

## Huge Increases for Weapons Upgrades

- More than half of the increase for Weapons Activities is allocated to **Directed Stockpile Work**, for which the Budget requests \$1.898 B; an increase of \$393 M (26%) over the 2010 appropriation.
- Within Directed Stockpile Work, \$649 M is requested for **Stockpile Systems**, which funds maintenance and upgrades of warheads in the current stockpile.
  - The largest portion of that would fund work on a major redesign of the B61 gravity-dropped bomb, which is the workhorse nuclear bomb in the U.S. inventory. Spending to maintain the B61 is slated to more than triple, from \$92 M in 2010 to \$317 M in 2011. That includes \$252 M for a “Phase 6.2/6.2A study” of refurbishment options including improvements to the safety and security of the warhead. Those “improvements” may require modifications to the nuclear primary and/or remanufacture of the canned subassembly (nuclear secondary). Warheads with significant modifications to their nuclear packages would be extremely difficult to certify as sufficiently safe and reliable to be reintroduced into the U.S. stockpile, without underground testing. Other increases throughout the Weapons Activities budget are directed at pursuing the difficult and questionable task of certifying modified warheads.
  - The Stockpile Systems line also includes a 78% increase (to \$85.9 M) for the W78 warhead, including \$26 M to initiate a Life Extension Study that will evaluate modifications to the nuclear explosives package for that warhead.
  - The upgrades to the B61 and W78 have huge outyear implications. In 2015, the combined funding for the two programs is slated to reach \$858 M, which is more than six times the amount NNSA currently spends to maintain the two warheads. In the five years through 2015, NNSA expects to spend more than \$3 B on these two upgrades, which will still be in their early phases at the end of that period. The Budget has no total cost estimate for either of the upgrade programs.

## Increases to Build and Certify New and Modified Plutonium Pits

- Directed Stockpile Work also includes \$941.5 M for **Stockpile Services**; an increase of \$112.8 M (13.6%) above FY 2010. This line funds research, development, and production in direct support for the stockpile. The largest increase in Stockpile Services is a boost of \$48.4 M (34%) to \$190.3 M for Plutonium Sustainment, which supports the manufacture of plutonium parts. That includes funding to support a

capability to build ten plutonium pits per year. In addition, there is a \$42.5 M boost (26%), to \$209.1 M, in R & D for certification of warheads, including expanded efforts in hydrodynamic testing, subcritical testing, and other plutonium experiments. All of those increases are part of a concerted effort to prepare for introducing new and modified weapons primaries into the stockpile without underground testing.

### **Cuts for Weapons Dismantlement and Disposition**

- The 2011 request for Weapons Dismantlement and Disposition is \$58.0 M; which is \$38.1 M (39.6%) *below* the FY 2010 level. The decrease reflects NNSA's plan to reduce the pace of dismantlements from the current rate of roughly 300 nuclear weapons per year. At that pace, it will be decades before NNSA can address the 4,200 retired weapons already awaiting dismantlement and the thousands more that may be retired under the New Strategic Arms Reduction Treaty (START). The Budget foresees no effort to address this backlog in the outyears. Projected funding for Dismantlement and Disposition remains at \$60 M or below through 2015. This sends the wrong signal to U.S. allies and foes regarding our obligations to achieve irreversible disarmament pursuant to the Non-Proliferation Treaty.

### **Campaigns Expand Nuclear Weapons Science and Technology**

- The total request for five **Campaigns**, aimed at expanding the science and technology base in support of nuclear weapons, is \$1.716 B; an increase of \$145 M (9.3%) over 2010.
  - The request for the **Science Campaign** is \$365.2 M; an increase \$69.6 M (24%).
  - The request for the **Engineering Campaign** is \$141.9 M; a decrease of \$8.1 M (5.4%).
  - The request for the **Advanced Simulation and Computing Campaign** is \$615.7 M; an increase of \$48.1 M (7.8%).
  - The request for the **Inertial Confinement Fusion Ignition and High Yield Campaign** is \$481.5 M; an increase of \$33.6 M (7.3%).
  - The request for the **Readiness Campaign** is \$112.1 M; an increase of \$12.1 M (12.1%).

### **Science Campaign Seeks Tools to Certify Modified Nuclear Components**

- The purpose of the Science Campaign is to expand the knowledge base of nuclear weapons science and allow NNSA to better assess the performance of exploding nuclear weapons. Within the Science Campaign, the **Advanced Certification** activity is slated for a quadrupling in funding to \$77 M. Under Advanced Certification, NNSA develops tools to certify that changes to the nuclear package of existing nuclear weapons can be introduced into the weapons stockpile without problems. Here again, the large ramp-up in this activity reflects the Obama Administration's strategy shift to allow for modifying the nuclear packages of existing weapons to improve their safety and performance.
- The **Engineering Campaign** aims to improve surveillance testing of all nuclear weapon components and further the design of non-nuclear components. The decrease in this program reflects NNSA's shift in priority away from surveillance testing and refurbishment of non-nuclear components to modifying nuclear components for achieving new goals.
- The **Advanced Simulation and Computing Campaign** provides the leading edge computing and simulation capabilities that NNSA uses to predict weapons performance and certify nuclear weapons. This program, which serves both near and longer term efforts at designing new nuclear weapons, is slated for a modest increase.

### **NIF Construction Complete, but ICF Budget Grows Without a Clear Schedule for Ignition**

- In the **Inertial Confinement Fusion (ICF) Ignition and High Yield Campaign**, NNSA creates and studies matter under extreme conditions, which approach the high temperature and pressure found in a nuclear explosion. Results from these experiments can help improve the computer codes used to design and certify

changes to nuclear weapons. However, most of the work under this campaign is long term in nature and not relevant to the current stockpile.

- The largest increases in the ICF Campaign in 2011 are for diagnostic equipment and for equipment that will allow experiments on cryogenic targets at the National Ignition Facility (NIF), located at the Lawrence Livermore National Laboratory. That subprogram is slated to receive \$102.6 M; an increase of \$30.4 M (42.5%) over 2010. NNSA underfunded those programs during the construction phase of the project, in order to hide the full cost of construction. A much larger amount was hidden from the NIF budget by charging substantial overhead costs to other projects. According to a recent DOE NNSA Office of Field Financial Management (OFFM) review, Livermore Lab management shifted \$80 million in NIF overhead costs to other programs in Fiscal Year 2010. The 2011 Budget Request continues the practice, which, according to the OFFM, violates Public Law 100-679 *Cost Accounting Standards*.
- The NIF, which began operating in 2009, is the world's largest and most powerful laser. The achievement of ignition and thermonuclear burn remains a priority for the program. However, NNSA has no projected date for achieving ignition at the NIF. Its only clear goal regarding ignition is to begin ignition-related experiments in 2010. According to the Budget, "the first ignition campaign (spanning FY 2010 to FY 2011) will attempt to compress, implode, and ignite a layered DT capsule with a ~1.3 megajoule energy pulse from the NIF."

### **NNSA is Producing Tritium beyond any Reasonable Requirement**

- In the **Readiness Campaign**, NNSA develops new production technologies for manufacturing non-nuclear components, including tritium. The Budget requests \$50.1 M in 2011 and \$345 M over five years for **Tritium Readiness**. Plans call for augmenting the current production of tritium in two nuclear reactors operated by the Tennessee Valley Administration (TVA) at Watts Bar, TN by adding production in two units at TVA's Sequoyah plant near Chattanooga, TN. Cuts in the nuclear stockpile, which have already occurred under the Strategic Offensive Reductions Treaty (SORT), also known as the Moscow Treaty, have added more than twenty years to NNSA's already substantial inventory of tritium. Additional cuts, expected under the new START Treaty, will free up more tritium and reduce requirements by nearly a factor of two, pushing the date at which any new tritium will be needed to beyond 2050. If NNSA ceased producing new tritium, it could eliminate all spending for Tritium Readiness plus about \$100 M/yr that it spends to operate the tritium extraction facility at the Savannah River Site.

### **Modest Operating Increase in Readiness in Technical Base and Facilities (RTBF)**

- NNSA includes the underlying operating costs of its facilities in a budget line called **Readiness in Technical Base and Facilities (RTBF)**. The 2011 request for Operation of Facilities within RTBF is \$1.258 B; a decrease of \$90.3 M (6.7%). However, the cost of supporting several facilities is shifted from NNSA to other organizations in 2011, including support for the Pit Disassembly and Conversion Facility at the Savannah River Site and support for the Advanced Recovery and Integrated Extraction System (ARIES) for separating plutonium at Los Alamos and Pantex. In addition, a one-time infusion of funds for pension costs in 2010 is no longer needed in 2011. Finally, Livermore Lab was able to reduce its operating costs due to the removal of all Category I and II special nuclear material from the site. The Budget does not give sufficient information to fully identify the funds involved in all of these changes. However, we estimate that without the one-time savings, the operating cost for comparable facilities in 2010 and 2011 would increase by about \$50 M (4%).

### **Costly, Oversized, and Unnecessary Projects are Funded under RTBF Construction**

- The 2011 request for RTBF Construction is \$399.0 M; an increase of \$95.1 M (31.3%) over 2010. Within that sum, several new projects are in their early stages and will have huge outyear costs. The Budget projects that spending on RTBF construction projects will increase by about 20% each year through 2015, when

NNSA expects it to reach \$722 M -- almost two and a half times the 2010 construction budget. Furthermore, NNSA has not determined the total cost of some of the largest projects. When those undetermined costs are included, the construction budget is likely to be considerably larger.

### **Chemistry and Metallurgy Research Facility Replacement (CMRR)**

- The Budget includes funding to complete the design and begin construction of a Chemistry and Metallurgy Research Facility Replacement (CMRR) at the Los Alamos National Laboratory. This facility would upgrade existing analytical capabilities in support of new pit production and surveillance of existing pits. It would also provide space for research and development of plutonium processing and fabrication. NNSA currently performs these tasks in an aging Chemistry and Metallurgy Research (CMR) facility, which is in need of safety upgrades. However, the design for the Nuclear Facility (NF) portion of the new CMRR is well in excess of current requirements and grossly oversized for the likely mission in 2022, when the that facility is scheduled for completion.
- The Budget requests \$225 M in 2011 for CMRR and an additional \$1.2 B through 2015. NNSA has not yet established the total cost of the project. NNSA's preliminary cost estimate is \$3.8 B, but DOE projects have a history of greatly exceeding preliminary cost estimates.
- The CMRR project has been divided into three phases, the first of which is nearly complete. The first phase funded construction of the Radiological Laboratory/Utility/Office Building (RLUOB). The second phase provides for installation of equipment into the RLUOB. The third, and by far the most expensive phase, would fund a Nuclear Facility (NF) for handling larger quantities of plutonium than the RLUOB is designed for. NNSA completed a preliminary design for the Nuclear Facility in December 2007. However, that design is under review and NNSA has not estimated when the baseline design will be completed. Nevertheless, NNSA's current total project cost estimate is \$3.4 B and the estimated start of operation is 2022. If NNSA were to minimize changes to the nuclear packages of existing nuclear weapons or size its plutonium capabilities to the stockpile that will emerge from the current START Treaty negotiations, it could cancel the CMRR Nuclear Facility and easily accommodate all operations within the RLOUB and the existing plutonium facility, PF-4, in Technical Area 55.

### **Technical Area-55 Reinvestment Project Phase II**

- In addition to the new CMRR Facility, NNSA is conducting a multiphase project to refurbish the existing plutonium handling facility, PF-4, at the Los Alamos National Lab. Phase I was completed in 2009 at a cost of \$15 M. The 2011 request to begin phase II, which includes seven subprojects, is \$20 M. The Budget includes an additional \$103 M in 2012-2015 for phase II activities, but does not provide a completion date or a total cost estimate for phase II. The Budget has no information on the cost or schedule for the thirteen, or more, projects it has reserved for phase III. These upgrades to PF-4 are a key element in NNSA's plans to modify plutonium pits within future life extension programs.

### **Uranium Processing Facility (UPF)**

- The Budget also includes funding to complete the design and begin construction of a Uranium Processing Facility (UPF) at the Y-12 facility in Oak Ridge; TN. NNSA wants to build the UPF to consolidate all enriched uranium operations at Y-12 into one facility that meets modern safety and security standards. NNSA has not yet completed a preliminary design for this facility, but a scoping study completed in July 2007 projected that the facility would cost between \$1.4 and \$3.5 B and might begin operation in 2018. That date has slipped considerably, since NNSA now projects that a preliminary engineering design will not be completed until April 2014. The Budget requests \$115 M in 2011 for UPF and an additional \$885 M through 2015.

- Current plans for the UPF do not fully account for anticipated reductions in the size of the nuclear weapons stockpile. The planned UPF is much larger than necessary and, by the time it could be completed, it might not be needed at all. NNSA could consolidate most, if not all, enriched uranium operations to support a smaller stockpile into the recently completed Highly Enriched Uranium Materials Facility (HEUMF) at Y-12.

**Construction Costs to Replace the Kansas City Plant are not included in the Budget**

- NNSA is planning to replace its existing Kansas City Plant, where it manufactures most non nuclear components, with a new facility about 10 miles from the current site. Construction of the new Kansas City Plant is estimated to cost \$660 M, exclusive of most of the specialized equipment. However, the entire construction cost is omitted from the Budget. NNSA has arranged for the private sector to build the plant and has agreed to lease the plant for at least 20 years. While the 20-year lease is a firm commitment by the Federal Government, NNSA has made that commitment without having any appropriated funds for the purpose. The lease payments will appear in future budgets after NNSA occupies the plant.
- Some of the cost related to the new facility is reflected in this budget. The 2011 base RTBF operations budget for the Kansas City Plant is \$186 M, which is a \$30 M (19%) increase over 2010 and a \$96 M (107%) increase over 2009. Much of the increase is for equipment for the new plant and to prepare for moving operations there.

**New Line Item for Science, Technology, and Engineering Capability for Other Agencies**

- The Budget includes a new line-item called Science, Technology, and Engineering Capability. Congress provided \$30 M in supplemental funding for 2009 for this program to develop infrastructure at NNSA’s national laboratories to serve the missions of other agencies. The Budget requests \$20 M to continue the program in 2011. The FY 2011 request is intended to fund a joint research and development program with the Department of Defense on counterterrorism, survivability, and weapon effects.

**Winners and Losers**

- There are clear “winners” and “losers” among the major NNSA sites in this year’s competition for funds from the NNSA [Nuclear] Weapons Activities Budget. The following table shows the percentage change from the 2010 appropriation to the 2011 request by site.

<u>Site</u>	<u>Percentage Change in Funding</u>
Los Alamos National Laboratory	+26
Sandia National Laboratories	+20
Kansas City Plant	+16
Lawrence Livermore National Laboratory	+ 6
Pantex Plant	- 0
Y-12 Plant	- 5
Nevada Test Site	- 6
Savannah River Site	- 17 (largely because the Pit
Disassembly and Conversion Project was moved into the Non-Proliferation Budget, as noted above.)	

**Conclusions and Recommendations**

The Obama Administration has closely coupled the increase in funding for [Nuclear] Weapons Activities to its goals in arms control. For example, on February 18, 2010, in a major speech on nuclear weapons at the National Defense University, Vice President Biden stated, “This investment is not only consistent with our non-proliferation agenda; it is essential to it.” We believe that the increase in funding is not essential for the task of

keeping the U.S. nuclear arsenal safe and reliable. It is neither necessary nor justified. Furthermore, we believe it will not bolster domestic political support for the Administration's non-proliferation agenda and will damage U.S. efforts internationally.

There is historical precedent for the failure of a large increase in funding for the nuclear weapons laboratories to result in support for arms control from conservatives in Congress. In October 1999, the U.S. Senate failed to ratify the Comprehensive Test Ban Treaty (CTBT), despite increases in funding for nuclear weapons activities in the 1999 and the 2000 budgets. Testing was not needed to maintain the stockpile then and it is not needed now.

A massive increase in funding is simply not needed today to keep the stockpile safe and reliable without testing and it is unlikely to be any more successful in buying off conservative support for the CTBT today than it was in 1999. The hypocrisy of preaching non-proliferation while increasing research and development and the infrastructure for production of nuclear weapons is self evident. It can only hinder U.S. efforts internationally.

Following are our recommendations for the highest priority/lowest risk changes to the budget request for [Nuclear] Weapons Activities. These changes would not in any way reduce the NNSA's ability to ensure that the U.S. nuclear weapons stockpile is safe and secure. Indeed, these recommended cuts to the Fiscal Year 2011 Budget Request support the Obama Administration's stated goals as it moves toward a world without nuclear weapons. Our recommendations would save at least \$850 million in 2011 alone and considerably more in the outyears.

- **Cancel plans to modify the physics packages of existing nuclear weapons** under life extension (or any other) programs, unless significant flaws are discovered. NNSA has determined that the lifetime of existing primaries is 100 years or more. Canned subassemblies (secondaries) are even more stable. Modifying them without underground testing would introduce more risk than maintaining them in their current conditions. Limiting changes to nuclear packages would allow savings in 2011 in several programs throughout the Budget, including an estimated:
  - \$200 million by reducing the scope of the B61 Life Extension Study;
  - \$30 million by reducing the scope of the W78 Life Extension Study;
  - \$100 million by reducing programs in Stockpile Services for producing and certifying new plutonium pits;
  - \$50 million in the Science Campaign for research on Advanced Certification for warheads with modified physics packages; and
  - \$100 million in related infrastructure in Stockpile Services and in RTBF.
- **Suspend all design and construction activities on the Chemistry and Metallurgy Research Facility Replacement Nuclear Facility (CMRR-NF) and the Uranium Processing Facility (UPF)** in favor of reviewing their need in light of anticipated reductions in the size of the stockpile. The reviews should examine options to use existing facilities at Los Alamos and Y-12, which have been completed or upgraded in the past few years. In 2011, this would save an estimated:
  - \$200 million by halting design and construction of the CMRR-NF; and
  - \$100 million by halting design and construction of the UPF.
- **Close out production of new tritium in an orderly manner.** NNSA should complete irradiation and tritium extraction for targets that have already been inserted into reactors, but not fabricate or insert new targets until supplies of tritium fall below the amount needed to support the projected stockpile for ten years. In 2011 this would save an estimated:
  - \$40 million for production of tritium in the Tritium Readiness Campaign; and
  - \$80 million for operation of the tritium extraction facility.

- **Use some of the savings to add \$50 million to the Dismantlement and Disposition program** to increase the rate of dismantling retired warheads. This is a key confidence-building measure for international negotiations on arms control and non-proliferation.
- **Finally, significant additional savings can be achieved** in the coming year by reducing or eliminating other questionable and/or inflated programs in Weapons Activities. Such programs include:
  - The National Ignition Facility;
  - The Advanced Simulation and Computing Campaign;
  - Construction of a new facility for the Kansas City Plant; and
  - The Science, Technology, and Engineering Capability Program and other congressional pork projects.

