



U.S. DEPARTMENT OF  
**ENERGY**



# Cost Estimating and Program Evaluation Fiscal Year 2015

Report to Congress  
November 2016

National Nuclear Security Administration  
United States Department of Energy  
Washington, DC 20585

# Message from the Administrator

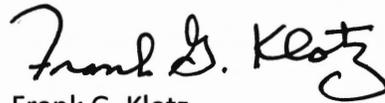
Accurately estimating costs, assessing alternatives, and evaluating the Department of Energy's National Nuclear Security Administration (DOE/NNSA) program performance on programs are vital to national security and the responsible expenditure of taxpayer dollars. The Office of Cost Estimating and Program Evaluation (CEPE) provides rigorous program analysis, sound fiscal guidance, and independent advice to NNSA and DOE to improve mission planning and performance. The establishment, maturation, and continued support of CEPE will help NNSA closely monitor major atomic energy defense acquisition programs.

This report is being provided to the following Members of Congress:

- **The Honorable John McCain**  
Chairman, Senate Committee on Armed Services
- **The Honorable Jack Reed**  
Ranking Member, Senate Committee on Armed Services
- **The Honorable Mac Thornberry**  
Chairman, House Armed Services Committee
- **The Honorable Adam Smith**  
Ranking Member, House Armed Services Committee
- **The Honorable Lamar Alexander**  
Chairman, Subcommittee on Energy and Water Development  
Senate Committee on Appropriations
- **The Honorable Dianne Feinstein**  
Ranking Member, Subcommittee on Energy and Water Development  
Senate Committee on Appropriations
- **The Honorable Michael Simpson**  
Chairman, Subcommittee on Energy and Water Development  
House Committee on Appropriations
- **The Honorable Marcy Kaptur**  
Ranking Member, Subcommittee on Energy and Water Development  
House Committee on Appropriations

If you have any questions or need additional information, please contact Mr. Clarence Bishop, Associate Administrator for External Affairs, at (202) 586-7332.

Sincerely,

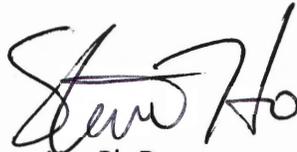


Frank G. Klotz  
Under Secretary for Nuclear Security  
Administrator, NNSA

## Message from the Director

In its first full year, the Office of Cost Estimating and Program Evaluation (CEPE) has met the goals set forth in the implementation plan briefed to Congress. The office is a key reform advocated by numerous external reviews and its development helps ensure that NNSA executes its programs on budget and on schedule. CEPE will continue to institutionalize its policies and develop its staff in service to the NNSA and its mission.

Sincerely,

A handwritten signature in black ink, appearing to read "Steven Ho". The signature is fluid and cursive, with the first name "Steven" and the last name "Ho" clearly distinguishable.

Steven Ho, Ph.D.

Director

Office of Cost Estimating and Program Evaluation, NNSA

## Executive Summary

NNSA's Office of Cost Estimating and Program Evaluation (CEPE), established by the *National Defense Authorization Act (NDAA), 2014* (Public Law 113-66), developed its implementation plan in coordination with the Office of Cost Assessment and Program Evaluation (CAPE) in the Office of the Secretary of Defense and in consultation with Congressional staff. CEPE has been standing up the office in accordance with that plan.

In fiscal year (FY) 2015, the Administrator selected the office's first Director. CEPE initiated two independent cost estimates, led the FY 2017-FY 2021 programming process, conducted front-end assessments, and drafted new policies for analyses of alternatives and independent cost estimates. CEPE hired its core staff, developed a long-term training plan in collaboration with CAPE, and continued to grow its cost analysis and resource management capabilities.

For FY 2015, NNSA's major atomic energy defense acquisition programs included the W76-1 Life Extension Program (LEP); B61-12 LEP; W88 Alteration (ALT) 370 with conventional high explosives (CHE) refresh; W80-4 LEP, and the Interoperable Warhead (IW)-1 LEP. As reported in the September 2015 Selected Acquisition Reports, the W76-1 LEP, B61-12 LEP, and W88 ALT 370 with CHE refresh are within budget and on schedule.



# Cost Estimating and Program Evaluation Fiscal Year 2015

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## I. Legislative Language

This report responds to section 2411(g) of Title 50, U.S.C. 2401 et seq., wherein it is stated:

*(g) REPORTS BY DIRECTOR.—The Director shall submit to Congress at or about the time that the budget of the President is submitted to Congress pursuant to section 1105(a) of title 31, United States Code, for each of fiscal years 2015 through 2018, a report that includes the following:*

- (1) A description of activities conducted by the Director during the calendar year preceding the submission of the report that are related to the duties and activities described in this section.*
- (2) A list of all major atomic energy defense acquisition programs and a concise description of the status of each such program and project in meeting cost and critical schedule milestones.*

Section 2411(h) defines major atomic energy defense acquisition program as follows:

*(1) MAJOR ATOMIC ENERGY DEFENSE ACQUISITION PROGRAM.—*

*(A) IN GENERAL.—Except as provided in subparagraph (B), the term “major atomic energy defense acquisition program” means an atomic energy defense acquisition program of the Administration—*

- (i) the total project cost of which is more than \$500,000,000; or*
- (ii) the total lifetime cost of which is more than \$1,000,000,000.*

*(B) EXCLUSION OF CAPITAL ASSETS ACQUISITION PROJECTS.—The term “major atomic energy defense acquisition program” does not include a project covered by Department of Energy Order 413.3 (or a successor order) for the acquisition of capital assets for atomic energy defense activities.*

## II. Cost Estimating and Program Evaluation (CEPE) Activities in Fiscal Year (FY) 2015

This report provides a description of the Department of Energy’s National Nuclear Security Administration’s (DOE/NNSA) CEPE activities for FY 2015, a list of all major atomic energy defense acquisition (MAEDA) programs, and a concise description of the status of each MAEDA program and project in meeting cost and critical schedule milestones. CEPE performed the following activities in the past year:

### a. Cost Estimation Activities.

1. **Independent Cost Estimates (ICEs).** CEPE cost estimators began conducting ICEs for the B61-12 Life Extension Program (LEP) and the W88 Alteration (ALT) 370 with

conventional high explosives refresh. The B61-12 LEP and W88 ALT 370 estimates will be completed in 2016 in advance of their Phase 6.4 milestones.

2. **Cost Data Collection.** CEPE completed an analysis of current technical, programmatic, and cost data collection needs to inform future cost estimating database requirements. These requirements will be included for consideration as NNSA implements the plan for an integrated financial management solution as required under Section 3128 of the *National Defense Authorization Act (NDAA) for FY 2014, "Plan for Improvement and Integration of Financial Management of Nuclear Security Enterprise."*
  3. **Front-End Assessments.** CEPE cost estimators are leading a front-end assessment on the total cost of NNSA sites, which will provide further clarity into the impact of indirect costs on the total cost of major programs. This endeavor will also help define financial data requirements in support of Section 3128 of the FY 2014 NDAA.
  4. **ICE Policies.** CEPE drafted new policies regarding the conduct of ICEs. These policies align current NNSA policies with Government Accountability Office (GAO) and Department of Defense (DOD) best practices in cost estimating and program evaluation.
- b. **Program Evaluation Activities.** CEPE's program evaluation team is a key capability in NNSA's revitalized Planning, Programming, Budgeting, and Evaluation (PPBE) process.
1. **Fiscal Guidance.** CEPE provided planning, programming, and fiscal guidance for the FY 2017-2021 budget request and led the integrated FY 2017-2021 program evaluation.
  2. **Budget Integration.** In FY 2015, CEPE staff led integration meetings both at headquarters and in the field that focused on NNSA's ability to execute its highest priority activities. These meetings improved integration across programs, incorporated participation from NNSA's Management and Operating (M&O) partners, and resulted in a more balanced budget plan that better reflected execution risks. This NNSA-wide corporate process ensured that the Secretary's and Administrator's priorities were adequately resourced in FY 2017 while better communicating concerns to NNSA and DOE leadership.
  3. **Front-End Assessments.** CEPE's program evaluation team initiated an enterprise-wide effort to conduct front-end assessments that match key NNSA capabilities to their accompanying infrastructure requirements. These assessments will inform the FY 2018 planning and programming process and ensure that investments are allocated to programs with the highest mission impact for the agency.
  4. **AoA Policies.** CEPE drafted new policies regarding the conduct of analyses of alternatives (AoAs), which inform the assessment of program requirements alternatives. The AoA Business Operating Procedure specifically incorporates GAO best practices into NNSA requirements for AoAs. CEPE advised on multiple AoAs throughout the year and offered actionable improvements to the process and products. Additionally, CEPE assessed the objectivity and thoroughness of completed AoAs according to GAO best practices and documented the results in sufficiency memoranda

addressed to the Administrator. CEPE submitted sufficiency memoranda for five AoAs by the end of calendar year 2015. The AoAs assessed include: Pantex Administrative Support Complex; Albuquerque Complex; Enriched Uranium Purification Process; Livermore Valley Open Campus; and Y-12 Emergency Operations Center.

5. **Project Management.** The Director of CEPE participates on the department-wide Project Management Risk Committee established in December 2014 and, in that role, advises on and assists with the assessment of risks for capital asset construction projects across DOE.
- c. **Staffing Activities.** NNSA staffing projections call for CEPE to grow cost analysis and resource management capabilities from the current strength of 10 full-time Federal employees to approximately 18 full-time Federal employees by FY 2017, dependent on NNSA's overall program direction funding levels and authorized full-time equivalent (FTE) level.
1. **CEPE Director.** The Administrator selected the first Director of CEPE in May 2015. The Director of CEPE is a member of the Senior Executive Service and serves as the principal advisor to the Administrator, the Deputy Secretary of Energy, and the Secretary of Energy regarding NNSA program evaluation and cost estimation.
  2. **Staff Additions.** CEPE hired four cost estimators, three program evaluators, and one systems engineer. These are senior-level hires and they have previously worked within DOD, the Department of Homeland Security, and NNSA, among other organizations.
  3. **Training.** CEPE developed an aggressive plan to continue training and developing its staff in the best resource analysis techniques. CEPE has coordinated a long-term plan with the DOD Office of Cost Assessment and Program Evaluation (CAPE) to train CEPE cost estimators in the latest cost estimating practices. CEPE's four cost estimators will complete a twelve-month detail at CAPE during which they will participate in cost estimates and learn how to adapt established DOD resource analysis capabilities to the NNSA mission. In 2015 two CEPE cost estimators completed details at CAPE.

### III. MAEDA Program Status

NNSA's current MAEDA programs consist of nuclear weapon systems undergoing life extensions or major alterations. CEPE will complete ICEs for two MAEDA programs in 2016 and will include the results in the FY 2016 status report.

#### ***W76-1 LEP***

The W76 warhead is deployed with the Trident II D5 missile on the Ohio-class nuclear ballistic missile submarines. The primary goals of the W76-1 LEP are to extend the original warhead service life from 20 to 60 years; address identified aging issues; incorporate nuclear surety enhancements; minimize system certification risk in the absence of underground nuclear testing; and refurbish the system in a managed, affordable manner.

As reported in the September 2015 Selected Acquisition Report (SAR), the W76-1 LEP is currently in Full Scale Production (Phase 6.6) and on schedule. Over half of the W76 LEP production effort has been completed, and the remainder will be completed by the end of FY 2019 with program closeout in FY 2020.

The baseline development estimate for the LEP is \$1.857 billion (Base Year 2002 dollars) or \$2.089 billion (Then Year dollars).<sup>1</sup> For LEPs and ALTs, the cost and schedule baseline for congressional reporting is provided in the first SAR submitted after the program enters Phase 6.3. The current estimated cost is \$3.027 billion (Base Year 2002 dollars) or \$3.621 billion (Then Year dollars).

### ***B61-12 LEP***

The B61 is a multipurpose nuclear gravity bomb. The B61-12 LEP refurbishes both nuclear and non-nuclear components to extend the bomb's service life while improving its safety, security, and reliability. With the addition of the Air Force provided tail-kit assembly, the B61-12 LEP will consolidate the existing B61 variants, known as mods 3/4/7/10, into the mod 12, which will provide strategic and extended deterrence for an additional 20 years following the First Production Unit in 2020.

As reported in the September 2015 SAR, the B61-12 LEP is currently in Development Engineering (Phase 6.3), with transition to Production Engineering (Phase 6.4) scheduled to occur in FY 2016<sup>2</sup>. Prior to entering Phase 6.4, the program will develop a Baseline Cost Report, which will update the program cost and schedule. First Production Unit (Phase 6.5) is scheduled to occur in FY 2020. The program is currently on track to meet the Phase 6.4 milestone in its baseline schedule.

The baseline development estimate for the LEP is \$6.581 billion (Base Year 2012 dollars) or \$7.344 billion (Then Year dollars). For LEPs and ALTs, the cost and schedule baseline for congressional reporting is provided in the first SAR submitted after the program enters Phase 6.3. The current estimated cost is \$6.549 billion (Base Year 2012 dollars) or \$7.372 billion (Then Year dollars).

This program will require \$763 million (Then Year dollars) of Other Program Money (OPM) for work performed by other NNSA development programs.<sup>3</sup> The B61-12 is the first nuclear weapon system to benefit from these development programs; other systems will use these programs as well. Reductions in funding for OPM activities have adversely affected technology and process maturation schedules and could potentially impact the ability to meet B61-12

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<sup>1</sup> Base Year dollars are fixed to a reference period for comparison. Then Year dollars include the effects of inflation or escalation and/or reflect the price levels expected to prevail during the year at issue.

<sup>2</sup> This report only covers FY 2015 activities. The B61-12 LEP entered Phase 6.4 in June 2016. The updated program cost and schedule will be provided in the Cost Estimating and Program Evaluation report for FY 2016.

<sup>3</sup> Other Program Money (OPM) refers to funding streams that cover earlier-stage technology maturation activities that fall outside of LEP line item funding.

scheduling commitments to the DOD. Shortfalls in OPM funding have necessitated the re-direction of LEP contingency funds.

### ***W88 Alteration 370 (W88 ALT 370)***

The W88 nuclear weapon, which entered the stockpile in late 1988, is deployed on the Navy's Trident II D5 submarine-launched ballistic missile (SLBM) system. The W88 Alt 370 replaces the arming, fuzing, and firing (AF&F) subsystem, enhances nuclear safety, and supports future alternatives for nuclear explosive package LEPs. As approved by the Nuclear Weapons Council and consistent with the President's FY 2016 Budget Request, this alteration will now include a refresh of the warhead's conventional high explosives (CHE).

According to the September 2015 SAR, the W88 ALT 370 is currently in Development Engineering (Phase 6.3), with transition to Production Engineering (Phase 6.4) scheduled to occur in February 2017. CHE refresh activities will be accelerated in FY 2016 so that Phase 6.4 authorization for the combined program is reached in February 2017.

The baseline development estimate for the alteration is \$1.341 billion (Base Year 2013 dollars) or \$1.449 (Then Year dollars). For LEPs and ALTs, the cost and schedule baseline for congressional reporting is dictated in the first SAR submitted after the program enters Phase 6.3. The current estimate cost is \$1.841 billion (Base Year 2013 dollars) or \$2.017 billion (Then Year dollars).

Additionally, this program will require \$127 million (Then Year dollars) of OPM for work performed by other NNSA development programs. Reductions in funding for OPM activities have adversely affected technology and process maturation schedules and could potentially impact the ability to meet W88 ALT 370 scheduling commitments to the DOD. Shortfalls in OPM funding have necessitated the redirection of ALT 370 contingency funds.

### ***W80-4 LEP***

The W80-4 LEP will consider W80-based reuse, refurbishment, and replacement options for nuclear and non-nuclear components to provide a warhead for the Air Force's cruise missile to replace the current, aging, Air-Launched Cruise Missile. To support the development of the U.S. Air Force's Long Range Standoff program, the Nuclear Weapons Council approved the W80-4 LEP to provide the warhead for the new platform.

The W80-4 LEP entered Feasibility Study and Down Select (Phase 6.2) in July 2015. The NNSA and the U.S. Air Force plan to achieve First Production Unit (Phase 6.5) by FY 2025, an acceleration of two years decided upon by the Nuclear Weapons Council in 2014 and incorporated into the President's FY 2016 Budget Request. NNSA has yet to establish a cost or schedule baseline for this LEP as the program has not yet completed Phase 6.2A.

### ***First Interoperable Warhead (IW-1) LEP***

The first ballistic missile warhead LEP is planned to be the W78/88-1 life-extended warhead that could be used in both U.S. Air Force and U.S. Navy aeroshells. The Nuclear Weapons Council's objective for this LEP is to deploy an interoperable nuclear explosive package for use in both the Mk21A intercontinental ballistic missile (ICBM) and the Mk5 SLBM aeroshells, with adaptable non-nuclear components. Hence, this LEP is referred to as the first IW option, the IW-1. IWs, together with the B61-12 and the Air Force cruise missile warhead, will lead to a reduction in both the overall stockpile numbers and the number of warhead types. The First Production Unit (Phase 6.5) is planned for FY 2030 with initial funding in FY 2020. NNSA has yet to establish a cost or schedule baseline for this LEP as the program has not yet completed Phase 6.2A.

## **IV. Conclusion**

CEPE will continue to help improve NNSA mission performance and success by providing an independent source of analysis to leadership. In the past year, CEPE worked to hire highly experienced staff, supply independent analysis to decision-makers, and improve current policies and procedures. CEPE will complete ICEs of two MAEDA programs in 2016. NNSA will continue to ensure that CEPE has sufficient skilled personnel to fulfill congressional requirements. CEPE's staffing level is dependent upon NNSA's Federal staffing cap and congressional support for NNSA's overall staffing level request.