SECRETARY OF DEFENSE
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WASHINGTON, DC 20301-1000

JAN 16 2014

The Honorable Howard P. "Buck" McKeon
Chairman
Committee on Armed Services
U.S. House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

In coordination with the Secretary of Energy and Commander, U.S. Strategic Command, I am pleased to provide the enclosed report, "Assessment of Nuclear Weapon Pit Production Requirements," pursuant to section 3147 of Public Law 112-239. This report details the rationale of the 50-80 pits per year requirement, including the factors considered in determining this requirement, an analysis and explanation of any changes to the current requirement, and the costs and implications of smaller and larger pit production capacities as defined in the Joint Explanatory Statement to accompany the National Defense Authorization Act for Fiscal Year 2013.

The Department of Defense has revalidated its requirement for 50-80 pits per year based on the demands of stockpile modernization, the commitments to a modern physical infrastructure, and the ability to hedge against technical failure or geopolitical risk.

I look forward to continuing to advise you on our efforts to provide the Nation with a safe, secure, and effective nuclear deterrent. Identical letters have been sent to the other congressional defense committees.

Sincerely,

Chuck Hagel

Enclosure:
As stated

cc:
The Honorable Adam Smith
Ranking Member

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(1)

Assessment of Nuclear Weapon Pit Production Requirements

The estimated cost of report or study for the Department of Defense is approximately
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(U) Introduction

(U) Historically, the nuclear weapon enterprise was characterized by large stockpiles of many different weapon types, constant modernization of both platforms and warheads, and continuous production. At the height of the Cold War, the Department of Energy's Rocky Flats Plant produced between 1,000 and 2,000 pits per year. In the 1990s the nuclear enterprise ended the continuous cycle of design and production as changing policies drove the shift in priorities away from test and production infrastructure and to a science-based Stockpile Stewardship Program. The long-term effect of this shift was a neglected test and production infrastructure. As warheads continued to age, Life Extension Programs (LEPs) and a modernized nuclear weapons complex became necessary to maintain the Nation's nuclear deterrent.

(U) Background

(U) The 2010 Nuclear Posture Review (NPR) stated the need for a modern physical infrastructure that would support the base workload (including life extension, surveillance, dismantlement, and naval nuclear propulsion) and provide some modest capacity to surge production in response to significant geopolitical surprise. To the degree that the infrastructure has capacity to support a surge, fewer reserve warheads are required. For the purposes of this report, this concept is referred to as a "responsive infrastructure," which offers an approach to nuclear deterrence more suitable to the post-Cold War era. This responsive infrastructure can lower quantities in the total stockpile by using capabilities, comprising critical skills and facilities, as hedge against uncertainty due to geopolitical and technical surprise. As treaties and Presidential guidance affect the stockpile size, the need for a responsive infrastructure becomes increasingly important. This approach requires consensus between Congress and the Administration that the Nation will invest in these capabilities, including continued pit production.

(U) The military requirements that determine stockpile size, which affect pit production capacity needs, are linked to tolerance for stockpile risk and infrastructure costs. A lower tolerance for risk requires greater production capacity and higher infrastructure investment costs. Variables considered in this relationship include stockpile size, the number of surveillance draws from the stockpile, pit lifetimes, assumptions on potential failures (i.e., technical hedge), and changes in the threat environment (i.e., geopolitical hedge).

(U) Although the term "responsive infrastructure" cannot be defined by a quantity of pits produced per year, the 2003 draft Environmental Impact Statement, "Supplemental Programmatic Environmental Impact Statement on Stockpile Stewardship and Management for a Modern Pit Facility," analyzed a wide range of pit production capacities (e.g., 100–450 pits per year). In 2008, the Nuclear Weapons Council (NWC) agreed on a strategy to balance cost, risk, and stockpile needs and established the requirement for 50–80 pits per year. A factor considered in this decision included the anticipated capacity using existing infrastructure at Los Alamos National Laboratory (Plutonium Facility 4 (PF-4)) and the Radiological Laboratory Utility Office Building (RLUOB)) (pending completed construction). Additionally, constructing a new "big-box" facility to replace the 60-year-old Chemistry and Metallurgy

Research (CMR) facility was required to support this decision.

(U) In 2012, the NWC initiated a study of stockpile planning options for the long term to ensure adequate development of warheads and infrastructure, aligned with platform modernization needs. The result was a 25-year plan for the nuclear enterprise that balances competing priorities in meeting national security requirements in a fiscally constrained environment. The plan also reaffirmed the NWC requirement for pit production capacity of up to 50 to 80 pits per year, which is consistent with current employment guidance, the central limits of the New START Treaty, and our commitments to Allies.

(U) Factors Affecting Current Requirement for 50 to 80 Pits per Year and Requirement Analysis

(U) The current requirement for a pit production capacity of 50–80 pits per year was informed by four factors:

(U) Policy Objectives for the Nuclear Deterrent

(U) The 2010 NPR reaffirmed U.S. policy to maintain a safe, secure, and effective nuclear deterrent for as long as nuclear weapons exist. Additionally, the United States will not develop new nuclear warheads but will consider a full range of approaches to maintain the stockpile, including refurbishment of existing warheads, reuse of nuclear components from different warheads, and replacement of nuclear components. Additionally, the NPR reaffirmed the concept of a responsive infrastructure capable of producing pits, as well as other components and materials, and designed to hedge against uncertainty, in both geopolitical events and technical failures. Policies on the hedge are intertwined with the degree to which the infrastructure is responsive. A more responsive infrastructure would require fewer reserve warheads to be maintained in the event of either a technical failure or geopolitical surprise. A less responsive infrastructure requires extra reserve warheads to be retained as a hedge. In Presidential guidance released on June 18, 2013, the President directed that warheads continue to be maintained to hedge against technical failure or geopolitical surprise, acknowledging that a more responsive infrastructure is at least a decade away.

(U) Stockpile Aging

(U) National laboratory efforts to understand and evaluate weapon lifetimes, including the plutonium pit, continue to indicate that U.S. nuclear weapons remain safe, secure, and reliable, but aging remains a significant concern. Weapon life extensions are required for aging components due to obsolescence and to ensure warhead safety, security, and effectiveness. The average age of weapons in today's stockpile is greater than 27 years. Programs to extend the lives of these weapons have served to mitigate some aging concerns; however, there are still other age-related issues that remain to be addressed. The impacts of aging plutonium were also considered in establishing a pit production requirement. Annex A explores the relationship between pit age and anticipated production rates in replacing the stockpile.

(U) Military Requirements

(U) To continue meeting DoD requirements for deployed weapons, nearly every warhead in the stockpile requires either significant maintenance or life extension within the next two to three decades. Executing these maintenance activities requires significant support from the nuclear security enterprise. The National Nuclear Security Administration (NNSA) design laboratories are working to establish the viability of pit reuse alternatives to mitigate the near-term production workload.

(U) Infrastructure Costs and Capacity

(U) In 2012, the NWC approved modifications to the NNSA stockpile management program to address budget concerns with the simultaneous execution of critical life extension activities and NNSA infrastructure modernization. Construction of the planned replacement facility for CMR was deferred for at least 5 years and emphasis was shifted to more urgent needs, including the construction of the Uranium Processing Facility at Y-12. To address plutonium needs, the NWC approved NNSA's near-term plans to upgrade plutonium infrastructure that would lead to a pit production capability of up to 30 pits per year in FY 2021 (i.e., ramping from 10 in FY 2019, to 20 in FY 2020, and finally 30 in FY 2021). DoD requirements call for a pit production capacity of 50–80 pits per year beginning in 2031. The NWC has revalidated its required for 50–80 pits per year based on the demand for stockpile modernization, the commitment to a modern physical infrastructure, and the ability to hedge against technical failure or geopolitical risk. If funded, the near- and long-term plans would be sufficient to support production of the first interoperable warhead for ballistic missiles: the W78/88-1.

(U) When fully implemented, the current NWC strategic plan provides for the long-term life extension of the current stockpile to address aging warheads and to incorporate, where appropriate, improved safety, security, and reliability features, with acceptable stockpile risk. The plan also assumes a demonstrated infrastructure capability and a corresponding reduction in non-deployed warheads, primarily through the deployment of interoperable warheads. By establishing requirements on stockpile quantities, the workflow through the complex becomes better defined. A requirement of 50–80 newly manufactured pits per year - the upper limit of production that can be achieved by the use of existing and planned infrastructure at Los Alamos - coupled with reuse of existing pits, most affordably manages the risk of sustaining the stockpile.

(U) National Security Costs and Implications of Various Capacities

(U) Future capabilities are influenced by the health of current facilities, planned facility investments, and operating costs for those facilities. Annex B provides a historical perspective of pit production costs. The NWC sponsored a Business Case Analysis (BCA) to review options for long-term plutonium sustainment. Any plan to develop and sustain a robust pit production capability has inherent risk because of the size of the investment (i.e., budget pressures) and the technical complexity of nuclear facilities. Estimated costs have not been included for all the plausible levels of pit production, but analysis indicates that reusing existing infrastructure coupled with smaller, scalable facilities for high-hazard work may prove cost-effective. DoD and NNSA will continue analysis as appropriate to narrow down cost estimates and will continue to inform Congress of findings.

(U) This section provides an assessment of various pit production capacities, specifically the implications for stockpile sustainment, enterprise capabilities, and hedge requirements. In each case, a lower, interim capacity is needed prior to achieving the final, steady-state capacity. As such, the NWC's plan to increase production capacities will ultimately achieve 50–80 pits per year in early 2030s.

(U) 10–20 pits per year by 2020

(U) A capacity of 10–20 pits per year can be accomplished starting in 2019 with existing infrastructure at TA-55, PF-4, and RLUOB, assuming appropriate investment. A static rate of 10–20 pits per year, however, precludes successful execution of the current strategic plan, and the stockpile size would decline over time as retired weapons would not be replaced. The infrastructure would not have the capacity to surge production in response to a geopolitical surprise. Maintenance of critical pit manufacturing skills may be at risk, and large numbers of reserve weapons would need to be maintained to serve as a geopolitical and technical hedge. Pit reuse issues will be addressed in a separate report.

(U) 20–30 pits per year by 2021

(U) A capacity of 20–30 pits per year can be accomplished with existing infrastructure at TA-55, PF-4, and RLUOB, but requires additional equipment and would not be available until FY 2021. A pit production capability of 20–30 pits per year places at risk the ability to execute the current strategic plan and to sustain in the long-term the size of the planned stockpile. The infrastructure may not have the capacity to surge production in response to a geopolitical surprise. Maintenance of critical pit manufacturing skills may be at risk, and very large numbers of reserve weapons would need to be maintained to serve as a geopolitical and technical hedge.

(U) 30–50 pits per year by 2030

(U) A capacity of 30–50 newly manufactured pits per year can be accomplished with existing infrastructure at TA-55 adjacent to PF-4, repurposing available space within PF-4, and maximum use of RLUOB, but requires additional equipment and investment in building space. A pit production capability of 30–50 newly manufactured pits per year places at risk the ability to accomplish the strategic plan from 2030 onward. This option also creates near-term certification risks due to a heavier reliance on reused pits to accomplish the strategic plan. The infrastructure may not have the capacity to surge production in response to a geopolitical surprise. Critical skills may atrophy with the low workload for skilled plutonium manufacturers and designers, and large numbers of reserve weapons may need to be maintained as a geopolitical and technical hedge.

(U) 50–80 pits per year by 2031

(U) At 50–80 pits per year, the nuclear enterprise will be able to, with acceptable risk, accomplish the necessary pit production for the strategic plan and to retain critical plutonium skills. This requires additional building space. At 50–80 pits per year, the manufacturing enterprise will be fully devoted to producing new pits for the currently planned life extension programs. Responsiveness to technological or geopolitical surprises would be achieved by adding shifts (50–80 pits per year is planned with one shift) to this production capability. The strategic plan in conjunction with a pit production capacity of 50–80 pits per year enables significant reduction in reserve warheads.

(U) Larger quantities

(U) Larger production quantities will require additional facilities and capabilities at undetermined cost. At more than 50–80 pits per year beyond 2031, the nuclear enterprise is sufficient to accomplish the necessary pit production for the strategic plan, maintain a responsive infrastructure, retain critical plutonium skills, and further reduce number of reserve warheads. Any increase in production beyond 50–80 pits per year will continue to reduce the amount of risk but also increase the costs.

(U) Conclusion

(U) The NWC has approved a plan for maintaining a safe, secure, and effective nuclear deterrent, which assumes a production capacity of 50–80 pits per year. This plan manages risk in meeting warhead LEP schedules. Near-term stockpile requirements and higher-than-expected costs of the "big-box" facility that would replace CMR have driven the NWC to adjust its plutonium strategy. The NWC is exploring alternative options that can meet near-term and enduring nuclear deterrence requirements at affordable cost. The NWC will study options and looks forward to working with Congress to implement an appropriate revised strategy.

Annex A: Effect of plutonium lifetime on production demand

(b)(3):42 USC §2168(a) (1)(C)--(FRD)

(U) Shown on the graph below is the cumulative number of pits expected to be produced from 2019 through 2075 at 10, 20, 30, 50, 80, and 125 pits per year. Overlaid with a solid black line is the cumulative number of pits manufactured per the current NWC strategic plan assumptions. Also shown in the solid blue line is the total number of pits that would be 85 years or older if no new pit manufacturing was conducted during this time period.

(U) This chart illustrates risk trade-offs considered by the NWC. However, pit aging and stockpile size are only two attributes that factor into the demand for pits—other important elements include Initial Operational Capability dates, the ability to manufacture new pits that incorporate additional safety and surety features into the stockpile, and the ability to respond to either technical or geopolitical surprise with new production.

(b)(3):42 USC §2168(a) (1)(C)--(FRD)

Annex B: (U) Historical Assessment of Plutonium Processing Facility Costs

(U) Current plutonium processing facilities will not support large production rates, and many components are rapidly approaching critical obsolescence. This includes the CMR facility, which is scheduled to phase out in 2019, and the production capability located in PF-4 at LANL, which will require reconfiguration for higher pit production rates and major recapitalization in 10–20 years. These facilities are very costly to maintain and/or replace. Thus, there are two basic components to cost—construction costs and operating costs. Construction costs largely follow a step-function trend with large amounts of funding required for each successive facility. The large costs are driven by many factors, including the regulatory environment (high hazard facilities are expensive) and the long timelines (20+ years) for moving from initial design to completion of these facilities. These costs informed the 2008 requirement selection of 50–80 pits per year.

(U) Historically, the 50–80 pits per year requirement was the result of the NWC balancing risks and costs, where 50–80 was determined to provide an affordable solution at an acceptable amount of risk to the warfighter. One of the factors in this decision was the relationship between projected costs and major construction projects. According to 2008 NWC historical analysis, the estimated costs for ranges of pit production create step functions as capacity increases, i.e., costs do not steadily increase but rather remain level until additional facilities and equipment are required for more production, then costs increase dramatically.

(U) The most recent estimate of construction of CMR replacement "big-box" facility is $3.7–5.8 billion. This step allows the enterprise to achieve 50 pits per year, with an additional 30 pits requiring additional people and equipment. The subsequent step function to exceed 80 pits per year, when CMRR-NF would no longer be sufficient, has not been evaluated for cost. Given the delays to date on replacing the CMR facility capability, further evaluations of the plutonium processing facility are now considering the age of the PF-4 facility.