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United States General Accounting Office
Washington, DC 20548

July 3, 2002

Congressional Requesters

Subject: NNSA: Nuclear Weapon Reports Need to Be More Detailed and Comprehensive

The National Nuclear Security Administration (NNSA), a separately organized agency within the Department of Energy (DOE), spends more than $5.5 billion a year to maintain the safety and reliability of the nation's nuclear weapon stockpile through an effort known as the Stockpile Stewardship Program. Because the United States is no longer designing and building new nuclear weapons, extending the life of each of the nine weapon types in the current stockpile is a key component of this program. To accomplish this task, NNSA will have 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 stockpile. Life extension efforts for each weapon type can cost hundreds of millions of dollars and take many years to complete.

Life extensions are carried out by three laboratories that perform research and development (R&D), design, and certification tasks and four production plants that disassemble weapons to be refurbished, manufacture and install the weapon components to be replaced, and reassemble the weapons. NNSA manages life extension efforts using a multipart nuclear weapon refurbishment process, referred to as the 6.X Process, that separates the life extension process into phases. The first three phases—6.1 Concept Assessment; 6.2 Feasibility Study and Option Down-Select; and 6.2A Design Definition and Cost Study—are primarily R&D activities and studies that determine what changes are needed to ensure that a weapon system remains a safe and reliable part of the nation's nuclear stockpile. The next three

phases—6.3 Development Engineering; 6.4 Production Engineering; and 6.5 First Production—convert the R&D designs into final designs and manufacturing processes in order to produce refurbished weapons that meet the military requirements set by the Department of Defense (DOD). The last phase—6.6 Full-Scale Production—manufactures and installs the components needed to refurbish the weapons undergoing life extension and returns refurbished weapons to the stockpile. The joint DOE-DOD Nuclear Weapons Council[1] approves life extensions at three points in this process—before the 6.2 Feasibility Study and Option Down-Select R&D phase begins, before the 6.3 Development Engineering phase begins, and before 6.6 Full-Scale Production begins.

The Congress has stated that the information available for overseeing these important activities is not adequate for its needs. As a result, the conference report on the Energy and Water Development Appropriations Act of Fiscal Year 2002 (P.L. 107-66, H.R. 2311) directs NNSA to begin submitting annual reports on its major defense acquisition programs to extend the life of nuclear weapons in the nation's stockpile. Specifically, the Congress directed NNSA to (1) identify criteria to designate which programs qualify as major defense acquisitions, (2) determine when reporting on major defense acquisition programs should begin and end, (3) address "each and all" blocks of weapon systems being refurbished using a "block" approach,[2] (4) submit reports similar in content and format to DOD's Selected Acquisition Reports (SAR), and (5) submit the reports on an annual basis to accompany the President's budget. DOD's SARs, which are required by 10 U.S.C. 2432, provide the Congress with information on DOD's major defense acquisition programs—those that meet certain thresholds for R&D, acquisition, or procurement costs. SARs include information on the current cost, schedule, and performance of weapon acquisition programs and compare current information to approved baseline estimates. SARs are intended to

[1]The Nuclear Weapons Council oversees technical and operational nuclear weapon issues from an interagency perspective and prepares the annual letter to the President for signature by the Secretaries of Defense and Energy that certifies that the stockpile is safe and reliable without underground testing.
[2]When a weapon system is refurbished using a block approach, the Nuclear Weapons Council has approved refurbishment for only a portion of the total number of weapons of that type in the stockpile. That segment is referred to as a block. The remaining weapons may be refurbished in additional blocks at a later date.

provide a comprehensive look at program progress by providing information on past performance, anticipated changes, and variances from planned cost, schedule, and performance estimates from program inception to completion, regardless of the program's stage of development. Prior to 1991, DOE issued reports on new weapon programs that were similar to the SARs, although those reports were not as detailed.

In response to congressional direction, NNSA has defined a major defense acquisition as a program costing $300 million or more over its lifetime. NNSA decided to begin reporting for each life extension effort after approval by the Nuclear Weapons Council to enter Phase 6.3 Development Engineering, and to end reporting with the completion of Phase 6.6 Full-Scale Production. Three of the four ongoing life extension programs meet these criteria—the W87 life extension, which is in full-scale production, and the W76 and W80 life extensions, which are in development engineering. Both the W76 and W80 are being refurbished using a block approach, with the life extension effort for the first block of each weapon system underway at this time. The fourth system, the B61, is still in the R&D stages of the process and does not meet NNSA's criteria for reporting. The Nuclear Weapon Acquisition Reports (NWAR) issued in April 2002 are based on similar weapon acquisition reports that DOE issued prior to 1991, rather than being based on DOD's current SARs.

The conference report directed that GAO review NNSA's NWARs within 90 days of their issuance. Our objectives were to (1) assess the criteria NNSA developed for NWAR reporting, (2) compare the NWARs with DOD's SARs, and (3) analyze the cost data presented in the NWARs. In response to these objectives, we analyzed the April 2002 NWARs for the W76, W80, and W87 life extension programs; reviewed DOD's criteria and guidance for the SARs; and compared NNSA's NWARs with DOD's SARs, including SARs covering acquisition programs at various stages of development. Finally, we compared the NWARs with the various plans being used to manage life extension efforts, NNSA's Fiscal Year 2003 budget submission, and NNSA's long-range *Future Years Nuclear Security Program* plan. We conducted our review from April 2002 through July 2002 in accordance with generally accepted government

auditing standards. We briefed your offices on the results of our review on Monday, June 24, 2002 (see enc. I).

In summary:

The criteria that NNSA developed for determining when its reporting should begin may prevent the Congress from receiving complete information on the cost of life extension efforts. Specifically, since NNSA begins reporting with the Development Engineering phase (6.3), significant amounts of time and money spent in earlier phases of the life extension process (6.1, 6.2, and 6.2A), which include R&D activities, are unaccounted for in the NWARs. For example, NNSA expects these early phases of life extension programs to constitute more than one-third of the total expected time to complete the 6.X process for each weapon system. While NNSA could not provide data on the costs of Phases 6.1, 6.2, and 6.2A, the agency conceded, in commenting on our report, that Phases 6.1 through 6.2A invariably include R&D. In contrast, DOD reports significant R&D costs in SARs specifically designated for that purpose. NNSA officials relied on their pre-1991 reports to determine the format and content of the current NWARs, such as excluding R&D costs from the reports. In addition, despite congressional direction to report data on "each and all" blocks of weapons being refurbished using a block approach, the criteria NNSA has chosen mean that the NWARs cover the costs only for the first block of those life extensions. However, during Phases 6.2 and 6.2A, NNSA develops planning data on the cost of refurbishing all weapons of a specific type, which could be reported in the NWARs.

The current NWARs are not comparable to DOD's SARs. In particular, the NWARs are less detailed and comprehensive. For example, SARs are based on a program's controlled cost, schedule, and performance baseline and are linked to DOD's budget and long-range *Future Years Defense Plan*. In contrast, while the NWARs are linked to the Fiscal Year 2003 budget, NNSA does not currently have a disciplined process to ensure that the NWARs are consistent with its long-range plan. NNSA is developing a planning, programming, budgeting, and evaluation system that it anticipates will provide the linkage between its budget and planning documents. We also found that

the NWARs omit significant cost and performance information. For example, DOD's SARs present extensive information on cost and schedule baselines and variances at both the program and major contractor levels. In contrast, while the NWARs have a format for reporting on program cost variances, no such analysis is included because NNSA views the 2002 NWARs as the baseline for future reports. In addition, the NWARs contain no information on program schedule baselines or variances. However, as we reported in December 2000,[3] the W87 life extension effort, which started in September 1994, has already exceeded its cost estimate by more than $300 million and fallen two years behind schedule—information that could have been included in the NWARs. Moreover, the NWARs do not present any information on cost and schedule baselines for any of the individual contractors who manage the laboratories and production plants working on each life extension effort.

Finally, the cost data in the NWARs exclude significant costs that are necessary to successfully complete the life extension efforts. For example, the W76 life extension managers have identified more than 130 items (deliverables) critical to the program's success that must be supplied by other NNSA Defense Programs components. These deliverables include things such as modifying production capabilities at the Y-12 Plant in Tennessee and construction projects such as expanding a production processing line at the Kansas City Plant in Missouri. However, NNSA includes only the direct costs shown in the Directed Stockpile Work portion of its budget in the NWARs. Other costs, such as those identified above, are included in the R&D (Campaigns) and infrastructure (Readiness in Technical Base and Facilities) portions of NNSA's budget and, under NNSA's rationale, are excluded from the NWARs. DOD, on the other hand, reports all costs specifically related to a weapon system covered by a SAR, including R&D, testing, and construction costs that are needed to support the delivery of the weapon system.

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[3]U.S. General Accounting Office, *Nuclear Weapons: Improved Management Needed to Implement the Stockpile Stewardship Program Effectively*, GAO-01-48 (Washington, D.C.: Dec. 14, 2000).

Conclusions

Overall, we believe that the current, initial set of NWARs represents a good beginning. However, rather than following congressional direction to submit reports similar in format and content to DOD's SARs, NNSA modeled its current NWARs on similar reports DOE had done prior to 1991 that were less detailed than SARs. NNSA could improve the quality and usefulness of its reports if the NWARs contained information comparable with what DOD includes in its SARs. For example, if NNSA started reporting at the 6.2 Feasibility Study and Option Down-Select phase and included all relevant costs from all portions of its budget structure, the Congress would have more complete information on the costs of each life extension. Such improvements would make NNSA's NWARs more comparable to the DOD SARs that the Congress directed NNSA to use as a model for weapon acquisition reporting.

Recommendations for Executive Action

To improve the quality and usefulness of the NWARs, we recommend that the Secretary direct the Administrator of the National Nuclear Security Administration to make the following improvements:

- begin reporting life extension costs at Phase 6.2 Feasibility Study and Option Down-Select;
- include available information on the estimated cost of additional blocks for those weapons refurbished using a block approach, recognizing that such information may be preliminary and subject to change;
- revise the analysis presented in the NWARs to conform more closely to that presented in DOD's SARs by including items such as baseline and variance information for each contractor working on a life extension; and
- include all weapon-specific R&D, testing, and construction costs, regardless of where the costs appear in NNSA's budget structure.

We provided NNSA with a draft of our report and received oral comments from NNSA's Director of Policy and Internal Controls Management. NNSA agreed with one of our recommendations and disagreed with the three other recommendations. In addition, NNSA provided clarifying comments that we incorporated as appropriate. Specifically, with regard to our recommendation that NNSA revise the analysis presented in the NWARs to conform more closely to that presented in DOD's SARs, NNSA agreed with our recommendation and promised to make improvements. NNSA's specific comments and our responses regarding the remaining three recommendations follow.

With regard to our recommendation that NNSA begin reporting with Phase 6.2, NNSA disagreed because it views 6.2 and 6.2A as study phases designed to determine the activities that will be included in a life extension effort. However, it recognized that these phases include R&D activities that extend into later phases of a life extension and suggested submitting a separate report to cover these phases. While we recognize that such supplemental reporting would be useful if it includes cost data, as well as schedule and performance data, we continue to believe that the costs incurred in the early 6.X phases are relevant to presenting a complete picture of life extension program costs to the Congress.

With regard to our recommendation that NNSA include information on the estimated cost of additional blocks for those weapons being refurbished using a block approach, NNSA disagreed because, in its view, the reason for using a block approach is to allow for changes in scope as program requirements change. In addition, under NNSA's reporting criteria, only those life extensions that have been approved by the Nuclear Weapons Council to enter Phase 6.3 are subject to reporting in NWARs. We recognize that cost estimates for refurbishing all of the weapons of a specific type represent planning information and are not final or of the same quality as the baseline data developed for Phase 6.3. However, we believe that this data can be presented in a way that clearly differentiates between planning data and an

approved block's baseline. By presenting this data in the NWARs, NNSA would provide the Congress with some information on what the potential total cost of refurbishing all of the weapons of a specific type might be and would assist the Congress in performing its oversight function.

Finally, with regard to our recommendation that NNSA include all weapon-specific costs in the NWARs, NNSA disagreed because it funds many R&D, testing, and construction activities in the Campaign and Readiness in Technical Base and Facilities categories of the budget. Those two budget categories fund activities that NNSA views as necessary to provide the "capability" to maintain the nuclear deterrent, whereas the Directed Stockpile Work budget category is used to fund direct costs of weapon refurbishment. In addition, NNSA noted that these capability costs would probably be incurred even if a specific life extension effort were to be canceled. We recognize that not all of the costs presented in the Campaign and Readiness in Technical Base and Facilities budget categories are related to a specific life extension effort. However, NNSA's *Future Years Nuclear Security Program* plan, budget justification, implementation plans, and other planning documents justify many expenditures based on the requirements of specific life extension efforts. For example, the *Future Years Nuclear Security Program* plan lists numerous activities under the Campaign category that are specifically related to individual life extensions, such as developing advanced firing system technology for the W80, developing instrumentation and hardware for W76 flight tests, and completing work on circuits for component miniaturization for the W76. In addition, the Readiness in Technical Base and Facilities budget justification includes several projects directly related to the W76, such as upgrading production bays and cells at the Pantex Plant and modifying the tritium loading and cleaning facilities at the Savannah River site. We believe these examples amply demonstrate that the information in the NWARs cannot be considered complete without incorporating cost information from the other components of the Defense Programs' budget that support individual life extension efforts.

As agreed with your offices, we will make copies of this report available to others upon request. This report will also be available at no charge on GAO's web site at http://www.gao.gov.

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If you have any questions about this report or need additional information, please contact me at (202) 512-3841 or James Noël, Assistant Director, at (202) 512-3591. Major contributors to this report include Delores Parrett, Mary Quinlan, Josey Ballenger, Angela Gjertson, and Nancy Crothers.

(Ms.) Gary L. Jones
Director, Natural Resources
and Environment

Enclosure

List of Requesters

The Honorable Harry Reid
Chairman, Subcommittee on Energy and Water Development
Committee on Appropriations
United States Senate

The Honorable Pete V. Domenici
Ranking Member, Subcommittee on Energy and Water Development
Committee on Appropriations
United States Senate

The Honorable Sonny Callahan
Chairman, Subcommittee on Energy and Water Development
Committee on Appropriations
House of Representatives

The Honorable Peter J. Visclosky
Ranking Member, Subcommittee on Energy and Water Development
Committee on Appropriations
House of Representatives

Briefing Presented on June 24, 2002

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Assessment of National Nuclear Security Administration Nuclear Weapon Acquisition Reporting

Prepared for the Subcommittee on Energy and Water Development, Senate Committee on Appropriations
and the Subcommittee on Energy and Water Development, House Committee on Appropriations

June 24, 2002

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Background

- Description of the congressional direction to National Nuclear Security Administration (NNSA) to begin issuing Nuclear Weapon Acquisition Reports (NWAR) on qualifying life extension programs
- Description of the Phase 6.X Process for weapon life extension activities
- Description of what NNSA has done in response to the congressional direction

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Congressional Direction to NNSA

- Submit selected acquisition reports on weapon system refurbishments and life extensions
- Identify criteria for
  - Major defense acquisition programs
  - When to start reporting for a weapon system
  - When to cease reporting for a weapon program
- Address "each and all" blocks of a weapon program
- Reports should be
  - Similar in content and format to Department of Defense's (DOD) Selected Acquisition Reports (SAR)
  - Submitted annually to accompany the President's budget

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Phase 6.X Process

- NNSA manages life extensions using a multi-part weapon acquisition process, known as the 6.X Process
  - Phase 6.1 Concept Assessment
    - Review surveillance findings and military requirements and develop life extension options
  - Phase 6.2 Feasibility Study and Option-Down Select
    - Analyze in depth each option from 6.1, identify major impacts on nuclear weapons complex, start project planning, select specific options
  - Phase 6.2A Design Definition and Cost Study
    - Further define and validate selected design options, initiate process development, develop milestones, develop Weapon Design and Cost Report with cost estimates

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Phase 6.X Process (cont'd)

- Phase 6.3 Development Engineering
  - Validate design options, produce test hardware, assess produciblity of designs, and initiate process development
- Phase 6.4 Production Engineering
  - Adapt developmental design into a producible design and prepare production facilities, complete acquisition of capital equipment, update production cost estimates
- Phase 6.5 First Production
  - Produce first refurbished weapons and verify that units produced meet design requirements
- Phase 6.6 Full-Scale Production

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What NNSA Has Done

- Determined criteria for reporting
  - Define major defense acquisition as costing $300 million or more
  - Begin reporting after Nuclear Weapons Council (NWC) approval to enter Phase 6.3 (Development Engineering)
  - End reporting with completion of Phase 6.6 (Full-Scale Production)
- Reported in NWARs on three of the four ongoing life extension programs
  - W76, W80, and W87 are covered
  - B61 is not covered because it is still in Phase 6.2/6.2A

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What NNSA Has Done (cont'd)

- For weapons being refurbished in blocks (W76 and W80), reported on only the first block
- In April, issued first NWARs since 1991

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Objectives and Scope

- Our objectives were to
  - Assess key NNSA criteria for NWAR reporting
  - Compare NWARs with DOD's SARs
  - Analyze the cost data presented in the NWARs

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Objectives and Scope (cont'd)

- To achieve our objectives, we
  - Analyzed the NWARs for the W76, W80, and W87 life extension programs
  - Interviewed NNSA headquarters and field officials
  - Compared NNSA's NWARs with several DOD SARs, reviewed the criteria and guidance DOD used to compile the SARs, and interviewed DOD officials
  - Compared the NWARs with the various plans being used to manage life extension activities, NNSA's FY 2003 budget submission, and NNSA's Future Years Nuclear Security Program (FYNSP) Plan

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Assessment of NNSA's Criteria

- NNSA does not report the research and development costs from Phases 6.1, 6.2, and 6.2A
  - Significant amounts of time and money can be spent in research and development phases (6.1, 6.2, 6.2A) of the weapon acquisition process
  - In contrast, DOD reports significant research and development costs in special SARs
  - Reporting could begin after initial NWC approval
    - NWC approves the start of Phase 6.2, as well as start of Phase 6.3
    - NNSA chose Phase 6.3 as beginning of NWAR reporting
  - If NNSA started reporting at Phase 6.2, NWARs could report significant research and development costs

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Assessment of NNSA's Criteria (cont'd)

- NNSA was directed to report on "each and all" blocks of weapons to be refurbished in blocks
- NNSA is reporting on only the first blocks of the W76 and W80 life extension programs (those blocks that have been approved by the NWC to begin Phase 6.3)
- NNSA could report more cost information, such as existing cost estimates for subsequent blocks of the W76, which are included in the Weapon Design and Cost Report developed at the end of Phase 6.2A

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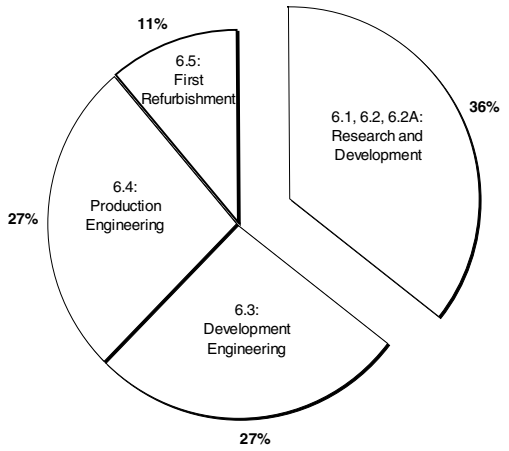
6.X Process Chart

6.X Process Time Assessment in Months



Source: Stockpile Life Extension Interim Program Plan, February 10, 2000, p. 27-28.
Note: Percentages may not equal 100% due to rounding.

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Comparison of NWARs and SARs

- Current NWARs are not comparable to DOD SARs
  - Less detailed
  - Less comprehensive
  - Omit significant phases of weapon system acquisition
  - Omit significant cost components
- Pre-1991 NWARs were also not comparable to DOD SARs for many of the same reasons

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Comparison (cont'd)

SARs	NWARs
• Approved baseline with cost, schedule, and quantity control	• Varying baselines – Formal change control process still being developed
• Comprehensive guidance ensures consistent preparation and compliance with acquisition management standards	• No written guidance – Rewriting old guidance used for pre-1991 NWARs

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Comparison (cont'd)

SARs	NWARs
• Link to budget and Future Years Defense Plan, which ensures consistency	• Link to budget; however, link to FYNSP cannot be established – No current process to cross-walk NWARs, budget, and FYNSP to ensure consistency

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Comparison (cont'd)

SARs	NWARs
• Cover all system-related costs	• Exclude known system-related costs, for example – ADAPT support for modifying Y-12 capabilities – Acorn Production Line expansion project at the Kansas City Plant

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Comparison (cont'd)

SARs	NWARs
• Identify major program milestones • Explain cost and schedule changes • Can begin with the development stage	• Identify major program milestones • No cost and schedule data in initial NWARs • Do not include development stages – Accurate data by weapon system has not been collected from the labs

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Comparison (cont'd)

SARs	NWARs
• Report on major contracts and contractor performance against baselines • Portion-marked for classification purposes, which aids review and reporting in unclassified contexts	• Do not report on contractor performance against baselines • Entirely classified; no portion-marking, which hampers review and reporting in unclassified contexts

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Assessment of NWAR Cost Data

- NNSA excludes non-Directed Stockpile Work (DSW) costs, such as
  - System-specific construction
  - Campaign work directly related to a refurbishment or life extension program
  - Readiness in Technical Base & Facilities (RTBF) work directly related to a life extension program

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Assessment of NWAR Cost Data (cont'd)

- NNSA's rationale is that the budget structure separates "capacity" from "capability"
  - DSW represents capacity and is reported (direct costs of life extension programs)
  - Campaigns and RTBF represent capability and are excluded (research and infrastructure that may support multiple life extension programs)
  - Congress has "agreed" to this budget structure by using it in appropriations
- Pre-1991 NWARs reported more cost data than the current NWARs

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