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The Honorable Dianne Feinstein
Ranking Member
Subcommittee on Energy and Water Development
Committee on Appropriations
United States Senate

The Honorable Edward J. Markey
United States Senate

National Nuclear Security Administration: Information on the Fiscal Year 2021 Budget Request and Affordability of Nuclear Modernization Activities

The United States is in the midst of a long-term effort to modernize its nuclear security enterprise. As part of this effort, the Department of Energy’s (DOE) National Nuclear Security Administration (NNSA)¹ is currently conducting four weapon modernization programs.² NNSA manages its weapon modernization programs in coordination with the Department of Defense (DOD), which undertakes related work to modernize nuclear weapon delivery systems, including heavy bombers, intercontinental ballistic missiles, and submarine-launched ballistic missiles and the submarines that carry them. In addition, NNSA is managing numerous, multi-billion-dollar construction projects and related activities to modernize the infrastructure it uses to produce the components and materials needed for its weapon modernization programs.

¹NNSA is a separately organized agency within DOE that is responsible for DOE’s nuclear weapons, nuclear nonproliferation, and naval reactor programs. It was created under Title 32 of the National Defense Authorization Act for Fiscal Year 2000, Pub. L. No. 106-65, §§ 3201 – 3299, 113 Stat. 512, 953-971 (1999) (codified as amended at 50 U.S.C. §§ 2401-2484).

²These programs are the B61-12 life extension program (LEP), the W88 Alteration 370, the W80-4 LEP, and the W87-1 Modification program. NNSA undertakes LEPs to refurbish or replace nuclear weapons’ components to extend their lives, enhance their safety and security characteristics, and consolidate the stockpile into fewer weapon types to minimize maintenance and testing costs while preserving needed military capabilities. Much like a nuclear weapon LEP, a weapon alteration replaces or refurbishes components to ensure the weapon can continue to meet military requirements. However, an alteration generally refurbishes fewer components than an LEP and does not specifically extend a weapon’s operational lifetime. The W87-1 Modification program will replace another weapon’s capabilities with a weapon composed of all newly manufactured components.

NNSA's modernization plans and budgets are communicated to Congress primarily through two key documents, which NNSA or DOE submits for each fiscal year. First, NNSA's *Stockpile Stewardship and Management Plan (SSMP)* provides information on the agency's modernization and operations plans and budget estimates over the following 25 years.³ Second, DOE's budget justification provides information in support of the President's budget for the following fiscal year, as well as information on modernization and operating programs and their budget estimates for the 4 fiscal years following that. This 5-year period presented in the budget justification is called the Future-Years Nuclear Security Program (FYNSP), and these estimates are identical to those presented in the first 5 years of the *SSMP*.⁴

In an April 2017 report examining NNSA's budget materials (the annual budget justification and the *SSMP* together), we concluded that NNSA had based its assessment of the affordability of its modernization activities—that is, whether its estimated funding needs would exceed projections of available resources—on optimistic assumptions about future-year costs, particularly for fiscal years 2022 through 2026.⁵ Specifically, we found that according to NNSA's fiscal year 2017 budget materials and agency officials, work deferred by NNSA to the years beyond the FYNSP contributed to a significant “bow wave”—or sharp increase—of funding needs in future years in order for the agency to undertake the multiple, simultaneous weapon modernization programs included in its plan.⁶ We recommended that NNSA include an assessment of its portfolio of modernization programs in future versions of the *SSMP*—for example, by presenting options NNSA could consider to bring its estimates of modernization funding needs into alignment with funding levels expected to be available under future budgets. These options could include potentially deferring the start of or canceling specific modernization programs if budget levels fell short of program estimates. In its *Fiscal Year 2020 SSMP*, NNSA presented information about its assessment of affordability in response to our 2017 recommendation.

In February 2018, DOD issued the *2018 Nuclear Posture Review (NPR)*, which outlined plans for continuing to modernize the nuclear security enterprise while accelerating an existing

³In addition, under section 1043 of the National Defense Authorization Act for Fiscal Year 2012, as amended, DOD and DOE are to develop a joint annual report that includes nuclear sustainment and modernization plans, as well as associated budget estimates for the 10 years following the date of the report. Pub. L. No. 112-81, § 1043(a) (2011), amended by the National Defense Authorization Act for Fiscal Year 2013, Pub. L. No. 112-239, § 1041 (2013), the National Defense Authorization Act for Fiscal Year 2014, Pub. L. No. 113-66, § 1054 (2013), the Carl Levin and Howard P. “Buck” McKeon National Defense Authorization Act for Fiscal Year 2015, Pub. L. No. 113-291, § 1643 (2014), the National Defense Authorization Act for Fiscal Year 2018, Pub. L. No. 115-91, § 1665 (2017), the John S. McCain National Defense Authorization Act for Fiscal Year 2019, Pub. L. No. 115-232, § 1670 (2018), and the National Defense Authorization Act for Fiscal Year 2020, Pub. L. No. 116-92, § 1665 (2019).

⁴The budget estimates for years included in the FYNSP reflect funding levels approved by the Office of Management and Budget, and these budget estimates must align with the 5-year overall federal budget estimates in the President's budget. The budget estimates for years beyond the FYNSP are not subject to this requirement.

⁵GAO, *National Nuclear Security Administration: Action Needed to Address Affordability of Nuclear Modernization Programs*, [GAO-17-341](#) (Washington, D.C.: Apr. 26, 2017).

⁶A funding “bow wave”—that is, an impending and significant increase in the requirements for additional funds—occurs when agencies defer costs of their programs to the future, beyond their programming periods, and often occurs when agencies are undertaking more programs than their resources can support.

program.⁷ According to DOD and DOE estimates, weapon modernization programs and related efforts will cost hundreds of billions of dollars over the next two decades, but neither agency has yet released budget estimates beyond the next 5 fiscal years that fully reflect implementation of the *2018 NPR*'s priorities.⁸ DOE's budget justification for fiscal year 2021 includes a 25 percent increase for NNSA's modernization activities, which is sustained over the FYNSP and suggests that the bow wave has arrived.⁹

In addition, the New START treaty with Russia will expire in February 2021, unless both parties agree to extend it for no more than 5 years.¹⁰ New START, which entered into force on February 5, 2011, commits both parties to reductions in deployed strategic delivery vehicles, nuclear warheads on deployed strategic delivery vehicles, and deployed and non-deployed launchers and heavy bombers, and includes rules for counting these items.¹¹ Some in Congress have raised questions as to whether New START's expiration would have implications for DOD's force structure, which informs NNSA's modernization requirements and associated costs.¹² For example, Members of Congress have raised concerns during congressional hearings that the expiration of New START would result in increases in the U.S. nuclear stockpile.

You asked us to review issues related to the affordability of NNSA's modernization activities as reflected in its nuclear security budget materials. This report provides information on four areas related to NNSA's modernization activities: (1) funding for nuclear modernization activities, (2) comparison of modernization activities in budget materials for fiscal year 2021 and earlier, (3) affordability discussion in the *Fiscal Year 2020 SSMP*, and (4) implications of potential New START expiration for modernization activities.

To address questions related to funding for nuclear modernization activities and to compare modernization activities in budget materials for fiscal year 2021 to those in prior years, we reviewed NNSA budget materials, including DOE's annual budget justifications and *SSMPs*.¹³ In

⁷Department of Defense, *2018 Nuclear Posture Review* (February 2018). NPRs are issued periodically to assess the global threat environment and establish policy on U.S. nuclear forces. The *2018 NPR* followed an NPR issued in 2010.

⁸As of June 2020, NNSA had not released the *Fiscal Year 2021 SSMP* reflecting longer-term planning that incorporates the *2018 NPR*, and DOE and DOD had not released their joint report on nuclear sustainment and modernization plans for either fiscal year 2020 or fiscal year 2021.

⁹DOE's fiscal year 2021 budget justification states that it "supports the modernization efforts and the scientific tools necessary to execute the *2018 Nuclear Posture Review*."

¹⁰*Treaty on Measures for the Further Reduction and Limitation of Strategic Offensive Arms*, U.S.-Russ., Apr. 8, 2010, T.I.A.S. No. 11-205.

¹¹For the purposes of this report, "strategic delivery vehicles" refer to intercontinental ballistic missiles, submarine-launched ballistic missiles, and heavy bombers.

¹²At the time that the Senate was considering ratifying New START, the Congress was also considering the *2010 NPR*, which provided an initial framework for increased investment in the nuclear security enterprise to modernize deterrent capabilities. We and others noted that linking New START ratification and nuclear weapons modernization investment was a "bargain" between the Congress and the Administration.

¹³At the time of our review, the *SSMP* for fiscal year 2021 was not yet complete. As a result, we discussed with NNSA officials information they said was included in the draft *Fiscal Year 2021 SSMP* and reviewed portions of the draft that were made available to us.

addition, to compare modernization activities for fiscal year 2021 to those in prior years, we reviewed NNSA documentation related to its proposed budget restructuring in fiscal year 2021 and the *2018 NPR*. We also compared NNSA budget materials for fiscal year 2021 with budget materials issued prior to the release of the *2018 NPR*—specifically, DOE’s budget justifications and the *SSMPs* for fiscal years 2017 and 2018—as well as with budgets issued after the release of the *2018 NPR*, which included DOE’s budget justification for NNSA and the *SSMPs* for fiscal years 2019 and 2020. We also interviewed DOE and NNSA officials. To further address questions related to modernization activities—specifically, to ascertain the relationship between the DOE’s budget request for NNSA and potential decreases in funding for other National Defense programs—we reviewed DOE and DOD budget materials and interviewed DOE, NNSA, and DOD officials.

To examine the affordability discussion in the *Fiscal Year 2020 SSMP*, we reviewed the *Fiscal Year 2020 SSMP* and interviewed NNSA officials. To examine the implications of the potential expiration of New START on NNSA’s assumptions underlying its modernization activities, we reviewed New START, verification and compliance reports regarding New START, and public statements from DOD and Department of State officials. We also interviewed relevant NNSA, DOE, and DOD officials to obtain their departments’ perspectives.

We conducted this performance audit from March 2020 to July 2020 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Funding for Nuclear Modernization Activities

How does NNSA obtain funding for its nuclear modernization activities?

Congress funds NNSA’s nuclear modernization activities through the Weapons Activities appropriation account.¹⁴ NNSA does not have a formal definition of modernization, as we have previously reported.¹⁵ Instead, NNSA officials consider everything funded by the Weapons Activities appropriation account to directly or indirectly support modernization. Appropriation accounts such as Weapons Activities include program activities, which provide a meaningful representation of the operations financed by a specific account, usually by program, project, or activity. We refer to these elements collectively as the “budget structure.”

What is the relationship between the Weapons Activities appropriation account and other accounts within the National Defense budget function?

The Weapons Activities appropriation account falls under the National Defense budget function (also known as budget function “050”), along with other NNSA, DOE, and DOD appropriations

¹⁴Weapons Activities is one of NNSA’s four appropriation accounts, together with Defense Nuclear Nonproliferation, Federal Salaries and Expenses, and Naval Reactors. Because this report focuses on the Weapons Activities account, the budget figures discussed generally exclude these other accounts except as specifically referenced.

¹⁵[GAO-17-341](#).

related to the common defense and security of the United States.¹⁶ Approximately 95 percent of discretionary funding under this function is for DOD and the intelligence agencies, including funding for military personnel and procurement, and nuclear-related aspects of DOD's budget, such as nuclear weapon delivery platforms, like submarines.

Within DOE, the National Defense budget function also covers other appropriations, including NNSA's Defense Nuclear Nonproliferation appropriation, which funds efforts to secure, consolidate, and dispose of weapons-usable nuclear materials and radiological sources,¹⁷ among other things. Another appropriation account under the National Defense budget function partially funds DOE's Office of Environmental Management (EM), which is responsible for decontaminating and decommissioning nuclear facilities and remediating sites contaminated from decades of nuclear weapons production and nuclear energy research.

In addition, discretionary defense spending for fiscal year 2021 may not exceed a certain statutory limit, or else a sequestration will be triggered. A sequestration is a cancellation of budgetary resources under a presidential order that would occur if appropriations exceeding the limits were to be enacted; it is evenly applied to all accounts subject to sequestration. Therefore, a proposed increase for a given program under the National Defense budget function may need to be offset by reductions in other defense programs to keep the defense budget within statutory spending limits.¹⁸

How does the budget structure for the Weapons Activities appropriation account in DOE's fiscal year 2021 budget justification differ from the structure in the enacted budget for fiscal year 2020?

DOE's fiscal year 2021 budget justification for NNSA proposes altering the budget structure of the Weapons Activities appropriation account compared to the fiscal year 2020 enacted budget. It does so primarily by establishing two new program activities—Stockpile Management and Production Modernization—to encompass weapon modernization programs and strategic material programs, among other things, that were previously under a single program activity called Directed Stockpile Work. According to NNSA documentation, this new budget structure will consolidate similar activities and facilitate improved program execution by organizing activities by how they are managed, leading to a simplified structure with greater transparency. For example, DOE's proposed change to the budget structure for fiscal year 2021 organizes activities for strategic materials management functions, such as plutonium or uranium, together with activities that support production of specific weapon components. In addition, proposed funding for certain activities previously identified in the budget—such as Storage and Material Recycling and Recovery, which both previously appeared under the Strategic Material

¹⁶Classifying the budget into functions provides a system for grouping budgetary resources to present national needs without regard to agency or organizational distinctions. The functional structure is relatively stable, but changes are made from time to time, generally after consultation between the Office of Management and Budget and the Appropriations and Budget Committees of the Senate and House of Representatives.

¹⁷Weapons-usable nuclear materials are highly enriched uranium, uranium-233, and any plutonium containing less than 80 percent of the isotope plutonium-238. Such materials are also often referred to as fissile materials or strategic special nuclear materials.

¹⁸The Balanced Budget and Emergency Deficit Control Act of 1985, as most recently amended by the Bipartisan Budget Act of 2019, sets statutory limits on defense and non-defense discretionary spending for fiscal year 2021.

Management program activity—have been dispersed across multiple program activities.¹⁹ For this reason, it is challenging to compare funding levels for program activities over time. NNSA also restructured its Research, Development, Test, and Evaluation Science program activity into a program activity called Stockpile Research, Technology, and Engineering. Table 1 shows the proposed structure’s five major program activities and corresponding program activities under the structure in fiscal year 2020 budget materials.

Table 1: Comparison of NNSA Budget Structures for Fiscal Years (FY) 2021 and 2020, Weapons Activities Appropriation Account

Program activity under FY 2021 budget structure	Description	Corresponding program activity under FY 2020 budget structure
Stockpile Management	Maintains the nation’s stockpile of nuclear warheads and bombs, including through life extension programs.	Directed Stockpile Work
Production Modernization ^a	Supports the production and processing of strategic materials.	Directed Stockpile Work
Stockpile Research, Technology, and Engineering ^b	Develops and maintains critical science and engineering capabilities, such as capabilities that enable the annual assessment of the safety and reliability of the stockpile.	Research, Development, Test, and Evaluation Science
Infrastructure and Operations	Maintains, operates, and modernizes NNSA’s infrastructure.	Infrastructure and Operations
Other weapons activities ^c	Provides for nuclear weapon security, secure transportation, and information technology and cyber security.	Other weapons activities

Source: GAO analysis of National Nuclear Security Administration (NNSA) information. | GAO-20-573R

^aThis program activity also incorporates several efforts previously under two other program activities—(1) Advanced Manufacturing Development, which was discontinued in the fiscal year 2021 budget structure, and (2) Infrastructure and Operations. Infrastructure and Operations continues as a separate program activity in fiscal year 2021; however, some of its scope was shifted.

^bThis program activity incorporates two efforts previously under the Directed Stockpile Work program activity—Research & Development Support and Research & Development Certification & Safety—and several programs previously under other program activities—Engineering; Advanced Manufacturing Development; Inertial Confinement Fusion Ignition and High Yield; and Advanced Simulation and Computing. Advanced Manufacturing Development and Engineering were discontinued in the fiscal year 2021 budget structure, and the other programs were subsumed under Stockpile, Research, Technology, and Engineering in the fiscal year 2021 budget structure.

^cOther weapons activities comprise Secure Transportation Asset, Defense Nuclear Security, Information Technology and Cybersecurity, and Legacy Contractor Pensions activities.

Comparison of Modernization Activities in Fiscal Year 2021 and Earlier Budget Materials

How do funding estimates in DOE’s fiscal year 2021 budget justification for NNSA’s nuclear modernization activities compare to funding estimates in budget materials issued prior to and after the release of the 2018 NPR?

¹⁹For example, DOE’s proposed funding for activities previously conducted under both Storage and Material Recycling and Recovery can be found in the fiscal year 2021 budget justification under Primary Capability Modernization, Secondary Capability Modernization, Tritium, and Domestic Uranium Enrichment within the Production Modernization program activity. However, DOE proposes funding for some Storage within the Stockpile Management program activity.

The funding estimates in DOE’s fiscal year 2021 budget justification for NNSA’s nuclear modernization activities (associated with its Weapons Activities appropriation account) over the FYNSP period (fiscal years 2021 through 2025) increased significantly compared to funding estimates for the same period in budget materials issued prior to and after the release of the *2018 NPR*.²⁰ Specifically, as shown in table 2, NNSA’s funding estimates for fiscal years 2021 through 2025 in budget materials for fiscal year 2021 totals approximately \$81 billion. This total is approximately:

- \$15 billion more (or about 23 percent greater) compared to NNSA’s estimates for the same period in its fiscal year 2020 budget materials;
- \$17 billion more (or about 27 percent greater) compared to its estimates for the same period in its fiscal year 2019 budget materials; and
- \$24 billion more (or about 43 percent greater) compared to its estimates for the same period in its fiscal year 2017 budget materials.²¹

Table 2: Comparison of Funding Estimates in NNSA Budget Materials for Fiscal Years (FY) 2017 through 2021

(Dollars in billions)

Budget materials for	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Total
FY 2017	10.5	11.3 ^a	11.5 ^a	11.7 ^a	11.9 ^a	56.9
FY 2019 ^b	12.3	12.7	12.9	13.0 ^a	13.2 ^a	64.1
FY 2020	12.8	13.0	13.1	13.4	13.8 ^a	66.1
FY 2021	15.6	15.9	16.3	16.6	17.0	81.4

Source: GAO analysis of National Nuclear Security Administration (NNSA) information. | GAO-20-573R

Note: Amounts are presented in nominal dollars, which are not adjusted for the effects of inflation. Because of rounding, sums of individual funding projections may not match totals.

^aThe budget estimate is beyond the 5-year Future-Years Nuclear Security Program (FYNSP) in DOE’s budget justification for NNSA for this fiscal year. According to NNSA officials, budget estimates for years beyond the FYNSP—which generally are included in NNSA’s annual *Stockpile Stewardship and Management Plan*—do not require approval by the Office of Management and Budget and reflect more uncertainty.

^bNNSA did not provide budget estimates for the FYNSP or years beyond the FYNSP in its budget materials for fiscal year 2018.

The proposed funding in DOE’s budget justification for NNSA’s nuclear modernization activities for fiscal year 2021 also increased significantly when compared to the enacted budget for fiscal year 2020. In particular, the proposed funding for NNSA’s nuclear modernization activities in fiscal year 2021 is about \$15.6 billion, which is about \$3.1 billion more than the enacted budget of about \$12.5 billion for modernization activities for fiscal year 2020. Table 3 provides more detail on proposed funding levels for NNSA’s nuclear modernization activities for fiscal year 2021 compared with its enacted budget for fiscal year 2020.

²⁰DOE’s fiscal year 2018 budget justification for NNSA’s nuclear modernization efforts was released in May 2017, but these materials did not include a FYNSP. In its budget materials, NNSA stated that the *2018 NPR* remained under development and that NNSA would issue a FYNSP (for fiscal years 2019 through 2023) in its budget materials for fiscal year 2019 in accordance with the *2018 NPR*. DOE’s fiscal year 2019 budget justification was released at the same time as the *2018 NPR*.

²¹These amounts are in nominal dollars, which are not adjusted for the effects of inflation.

Table 3: Comparison of Proposed Funding in NNSA’s Fiscal Year (FY) 2021 Budget Materials with Enacted Budget for FY 2020

(Dollars in billions)

Program activity in FY 2021 budget materials	Proposed funding for FY 2021	Enacted budget for FY 2020	Difference between proposed and enacted
Stockpile Management	4.3	3.7 ^a	0.6
Production Modernization	2.5	1.6 ^a	0.9
Stockpile Research and Engineering	2.8	2.5 ^a	0.2
Infrastructure and Operations ^b	4.4	3.2	1.2
Other weapons activities ^c	1.7	1.5	0.2

Source: GAO analysis of National Nuclear Security Administration (NNSA) information. | GAO-20-573R

Note: Because of rounding, sums of proposed funding amounts may not match totals.

^aThese amounts correspond to program activities in the fiscal year 2020 enacted budget in terms of the budget structure proposed for fiscal year 2021.

^bA portion of the change from the fiscal year 2020 enacted budget for Infrastructure and Operations is attributable to a one-time, planned reduction in fiscal year 2020 of approximately \$60 million for the Maintenance and Repair of Facilities program.

^cOther weapons activities comprise Secure Transportation Asset, Defense Nuclear Security, Information Technology and Cybersecurity, and Legacy Contractor Pensions program activities.

At a more detailed level, as shown in table 4, the proposed funding for 12 NNSA activities in DOE’s fiscal year 2021 budget justification increased by almost \$3 billion compared to the fiscal year 2020 enacted budget and compared to the budget estimate for fiscal year 2021 included in DOE’s fiscal year 2020 justification.²²

Table 4: Change in Proposed Funding in DOE’s Fiscal Year (FY) 2021 Budget Justification for Selected NNSA Modernization Efforts Compared to FY 2020 Enacted Budget and FY 2020 Estimates for FY 2021

(Dollars in millions)

Activities in FY 2021 budget	Change from FY 2020 enacted budget	Change from FY 2021 budget estimate included in FY 2020 budget justification
W87-1 Modernization Program	+429.0	+177.7
Maintenance and Repair of Facilities ^a	+336.0	+312.0
Los Alamos Plutonium Operations	+323.6	+328.5
Programmatic Construction ^b	+248.9	+479.9
Savannah River Plutonium Processing Facility ^c	+241.9	+241.9
Infrastructure and Safety	+222.3	+291.1

²²While the proposed funding increases across these 12 activities in the fiscal year 2021 budget justification total almost \$2.7 billion compared to the fiscal year 2020 enacted budget, the proposed funding for other activities decreased. For example, DOE’s fiscal year 2021 budget justification proposes about \$31 million for the sustainment of the B83-1 gravity bomb, compared to its fiscal year 2020 enacted budget of \$51 million.

Activities in FY 2021 budget	Change from FY 2020 enacted budget	Change from FY 2021 budget estimate included in FY 2020 budget justification
Plutonium Pit Production Project, Los Alamos National Laboratory	+204.8	+231.3
Assessment Science	+178.3	+656.8
Secondary Capability Modernization	+163.5	+126.2
Operations of Facilities	+114.0	+99.0
Mission-Enabling Construction ^b	+107.0	+21.0
W80-4 Life Extension Program	+101.8	-23.7
Total	+2,671.1	+2,941.6

Source: GAO analysis of Department of Energy (DOE)/National Nuclear Security Administration (NNSA) information. | GAO-20-573R

Note: These activities represent those for which the request for fiscal year 2021 exceeded the amount in the fiscal year 2020 enacted budget by more than \$100 million. With the exception of the Savannah River Plutonium Processing Facility, these programs and projects (or comparable programs and projects) were allocated funds for fiscal year 2020. However, because DOE's fiscal year 2021 budget justification for NNSA reflects its proposed new budget structure, FYNSP data are undetermined for some activities.

^aThe change from the fiscal year 2020 enacted budget for Maintenance and Repair of Facilities is in part attributable to a one-time, planned reduction to address carryover balances. According to NNSA officials, the fiscal year 2021 requested increase to the program allows NNSA to retain the current maintenance staffing levels and provides additional funding for targeted activities outlined in DOE's fiscal year 2021 budget justification.

^bProgrammatic Construction and Mission-Enabling Construction are activities consisting of specific line-item capital asset acquisitions. In the fiscal year 2020 budget structure, both activities were combined under one called Infrastructure and Operations Construction. To compare these two activities we have examined the fiscal year 2021 budget justifications and fiscal year 2021 FYNSP in the fiscal year 2020 budget justification for the underlying projects.

^cThis activity is new in the fiscal year 2021 budget justification. Funding was allocated in fiscal year 2020 to support preliminary design for the Savannah River Plutonium Processing Facility; however, it was included under a different program activity along with funds for other plutonium efforts.

What factors contributed to the large increase in proposed funding in DOE's fiscal year 2021 budget justification for NNSA's nuclear modernization activities compared to NNSA's enacted budget for fiscal year 2020?

According to our analysis of NNSA documents and interviews with NNSA officials, a reevaluation of the funding needed to meet existing requirements, rather than costs associated with new requirements, was the main factor contributing to the large increase in proposed funding in DOE's fiscal year 2021 budget justification. In particular, NNSA officials identified two ways in which this reevaluation of the funding needed to meet existing requirements drove the large increase in proposed funding for fiscal year 2021.

- NNSA officials said that the agency undertook a concerted effort with the fiscal year 2021 budget justification to base proposed funding on an assessment of the funding needed to achieve the agency's overall modernization requirements. According to these officials, this approach differed from that of prior years, in which it had been common to escalate prior years' budgets to reflect inflation (based on guidance from the Office of Management and Budget) rather than base proposed funding strictly on programmatic requirements. Officials also said that DOE and NNSA have made it known for a number of years that the nuclear security enterprise would require significant and sustained funding beyond the amounts reflected in its budget materials to achieve the agency's overall modernization requirements. For example, officials cited a 2015 letter from the

Secretary of Energy at the time to the director of the Office of Management and Budget estimating that the agency needed an additional \$5.2 billion over fiscal years 2018 through 2021 to “establish a viable and sustainable program portfolio.” This letter expressed concern that the FYNSP supported by the Office of Management and Budget at the time was not sufficient to support program requirements.

- NNSA officials also attributed some of the reevaluation of costs underlying the increase in proposed funding in the fiscal year 2021 budget justification to a more precise understanding of programmatic costs as planning for these programs matured.

In addition, our own analysis shows that most of the increase in proposed funding for fiscal year 2021 supports modernization activities already planned or under way prior to the release of the *2018 NPR* (as opposed to supporting new requirements introduced in the *NPR*).²³ For example:

- The *2018 NPR* called for NNSA to advance the restart of a program to replace the W78 nuclear warhead, which had been suspended in 2014. Prior to the release of the *2018 NPR*, NNSA and DOD had planned to resume this program in 2020 but instead resumed the program—and re-designated it as the W87-1 Modification Program—in 2019 in response to the *NPR*. For fiscal year 2020, the enacted budget for this program was \$112 million, and NNSA projected in the fiscal year 2020 FYNSP that it would need \$363 million in funding for fiscal year 2021. In comparison, DOE’s budget justification for fiscal year 2021 proposes \$541 million for the W87-1 Modification Program. NNSA officials said that the near-term increase in proposed funding for this program did not represent an increase to the overall estimated cost of the program but rather reflected changes in the program’s near-term scope and schedule.
- Planning was well under way in 2017, prior to the release of the *NPR*, to manufacture plutonium pits, a key nuclear weapon component. While the specific project for the Savannah River Plutonium Processing Facility had not been established in DOE’s fiscal year 2020 budget justification for NNSA, \$246 million in funding was allocated under a different program activity to support the project.
- Of the \$248.9 million increase proposed for Programmatic Construction,²⁴ all but \$31 million is associated with projects for which construction was scheduled to begin in fiscal 2018 or earlier.

Additional factors that contributed to the increase in proposed funding in DOE’s fiscal year 2021 budget justification for NNSA’s nuclear modernization activities (compared to the enacted budget for fiscal year 2020) were new program and project starts. These new program and project starts are part of NNSA’s overall modernization efforts but are not specifically discussed in the *2018 NPR*. They account for a small part of the overall \$3.1 billion increase compared to the activities discussed above and listed in table 4. For example, DOE’s fiscal year 2021 budget justification for NNSA proposes \$53 million for the W93, a submarine-launched ballistic missile warhead. In addition, the budget justification includes a \$31 million proposal to begin constructing the high explosives synthesis facility at the Pantex Plant in Texas.

²³We are assessing DOD and NNSA plans for implementation of modernization efforts recommended by the *2018 NPR* and plans in the event of cost increases or delays under a provision of the House report accompanying H.R. 2500, a bill for the National Defense Authorization Act for Fiscal Year 2020.

²⁴DOE’s budget justification for fiscal year 2021 for Programmatic Construction represents a \$248.9 million increase from the enacted budget for the comparable activity in fiscal year 2020 when accounting for the reorganization of projects between activities in the proposed budget structure. The overall increase in the fiscal year 2021 budget justification for this activity, not accounting for this restructuring, is \$298.9 million.

Which program activities in the National Defense budget function have lower levels of proposed funding in the President's fiscal year 2021 budget to offset the increase in proposed funding for NNSA's modernization activities?

According to DOD officials, the department identified approximately \$1.6 billion in funding reductions from two DOD activities to offset the increase in proposed funding for NNSA's modernization activities. These two activities are the Virginia class submarine activity and the Facilities Sustainment, Restoration, and Modernization activity.²⁵ DOD officials declined to provide additional details, stating that the details pertain to interim positions considered prior to the finalization of the President's budget request. Regarding the Virginia class submarine program activity, we note that the President's fiscal year 2021 budget proposed \$4.7 billion in funding for the procurement of one Virginia class submarine rather than the two called for in the National Defense Strategy.²⁶ In comparison, the fiscal year 2020 enacted budget for the Virginia class submarine program was \$8.8 billion. In addition, in DOD's fiscal year 2020 budget justification, DOD's budget estimate for fiscal year 2021 was \$6.3 billion for the procurement of two Virginia class submarines.²⁷

According to DOE officials, the increase in proposed funding for NNSA's modernization activities resulted in decreases in proposed funding for some DOE program activities in the National Defense budget function. However, these officials similarly declined to specify the program activities for which proposed funding was decreased. In addition, the fiscal year 2021 budget materials for other DOE national defense programs do not clearly identify specific program activities for which lower funding levels were proposed to offset the increase in proposed funding for NNSA's modernization activities. Regarding other DOE national defense programs that show decreases in DOE's fiscal year 2021 budget justification compared to the fiscal year 2020 enacted budget:

- Proposed funding for Defense Nuclear Nonproliferation for fiscal year 2021 is \$2.0 billion, compared to the enacted budget for fiscal year 2020 of \$2.2 billion. However, according to the budget justification, this decrease in proposed funding is mainly a result of the termination of the Mixed Oxide Fuel Fabrication Facility construction project. Furthermore, the \$2.0 billion request matches the amount estimated for fiscal year 2021 in the fiscal year 2020 budget justification.
- Proposed funding for EM's program activities for fiscal year 2021 is \$6.2 billion, compared to the enacted budget for fiscal year 2020 of \$7.5 billion.²⁸ This proposed

²⁵The Facilities Sustainment, Restoration, and Modernization activity supports DOD maintenance, demolition, restoration, and modernization of installation infrastructure.

²⁶DOD, *Summary of the 2018 National Defense Strategy of the United States of America: Sharpening the American Military's Competitive Edge* (Jan. 19, 2018).

²⁷Similar to NNSA's FYNSP, DOD budgets include a Future Years Defense Program (FYDP) that covers the next fiscal year's budget request and an additional 4 fiscal years of budget estimates.

²⁸EM's portion of DOE's annual budget justification does not include budget estimates for an additional four years the way NNSA's portion includes a FYNSP. The submission of such information was first mandated in 2011, but EM only submitted it twice since then—once in 2012 and most recently in August 2017, 3 months after the fiscal year 2018 budget was submitted. As a result, information was not available to assess EM's proposed funding for fiscal year 2021 against a fiscal year 2021 budget estimate made in fiscal year 2020. See GAO, *Department of Energy: Program-Wide Strategy and Better Reporting Needed to Address Growing Environmental Cleanup Liability*, [GAO-19-28](#) (Washington, D.C.: Jan. 29, 2019).

funding includes a reduction of \$1.2 billion for the Defense Environmental Cleanup appropriation account. This reduction would serve as an offset to DOE's requested increase for the Weapons Activities appropriation account when considering the National Defense budget function. According to DOE EM officials, the decrease in EM's proposed funding for fiscal year 2021 reflected "an allocation of available resources, given national defense priorities."

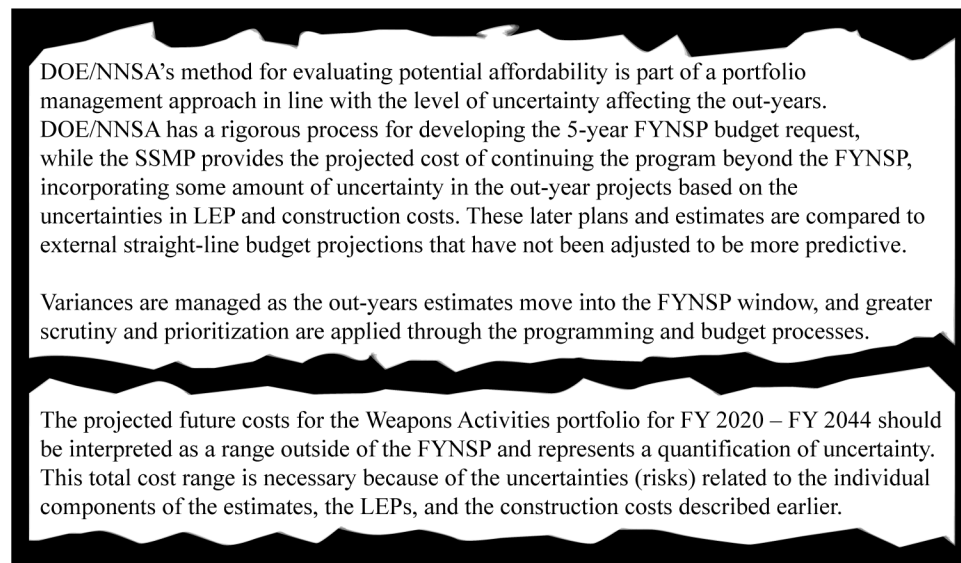
Affordability Discussion in the *Fiscal Year 2020 SSMP*

How does the *Fiscal Year 2020 SSMP* address GAO's 2017 recommendation that NNSA include an assessment of the affordability of its portfolio of modernization programs?

The *Fiscal Year 2020 SSMP* included a new section entitled, "Affordability Analysis," which NNSA added in response to our April 2017 recommendation, according to NNSA officials. Our recommendation addressed a shortfall between NNSA's projected budget needs to meet program requirements and projections of the President's budget, a condition that could recur in the future. An excerpt from the Affordability Analysis section of the *Fiscal Year 2020 SSMP*, which discusses estimates within the FYNSP and 20 years beyond, is shown in figure 1. According to NNSA officials, its affordability analysis provides a higher degree of certainty within the FYSNP due to more mature understanding of program costs.²⁹ The additional 20 years of budget estimates beyond the FYNSP is presented as a range of potential costs, based on cost estimates and data on actual costs from previous programs, which are compared to future-year funding projections provided by the Office of Management and Budget. According to NNSA, these projections are largely based on escalation for inflation. In our 2017 report, we found that even the low end of the cost range estimates NNSA included in the SSMP in some cases exceeded funding projections.

²⁹We note that the 2015 letter from the Secretary of Energy at the time to the director of the Office of Management and Budget—which NNSA officials cited in describing the factors contributing to the increase in NNSA's proposed budget for modernization activities—calls into question the sufficiency of the funding levels included in the FYNSP at that time for achieving program requirements.

Figure 1: Excerpt from the Affordability Analysis Section in the *Fiscal Year 2020 Stockpile Stewardship and Management Plan*



Source: National Nuclear Security Administration's *Fiscal Year 2020 Stockpile Stewardship and Management Plan*. | GAO-20-573R

As we stated in March 2020, NNSA's new section on affordability does not fully respond to our recommendation because it does not provide information about how potential misalignment between NNSA's estimates of future modernization funding needs and projections of the President's modernization budgets may be addressed, or about the potential effects of adjusting program schedules, or cost or schedule overruns.³⁰ We recognize that there are challenges to long-term budget estimation in an uncertain budgetary environment and that NNSA's program of record must be flexible to adapt to changing geopolitical realities. However, NNSA's modernization program of record covers decades, and individual programs are planned to take more than a decade to complete. As a result, it is essential for NNSA to present information to Congress and other key decision makers indicating whether the agency has prioritized certain modernization programs or considered trade-offs (such as deferring or canceling specific modernization programs) to help contextualize the effects of one-year budget decisions on a decades-long portfolio plan.

In our discussions with NNSA officials regarding the new affordability section in the *Fiscal Year 2020 SSMP*, NNSA officials stated that high-level programmatic requirements for nuclear weapons are set by DOD and approved by the Nuclear Weapons Council,³¹ a joint body in which both DOD and DOE participate. As a result, these officials said that NNSA cannot

³⁰GAO, *Nuclear Weapons: NNSA's Modernization Efforts Would Benefit from a Portfolio Management Approach*, [GAO-20-443T](#) (Washington, D.C.: Mar. 3, 2020).

³¹10 U.S.C. § 179 assigns responsibility for "... Coordinating and approving programming and budget matters pertaining to nuclear weapons programs between the Department of Defense and the Department of Energy..." and, "Coordinating and approving activities conducted by the Department of Energy for the study, development, production, and retirement of nuclear warheads, including concept definition studies, feasibility studies, engineering development, hardware component fabrication, warhead production, and warhead retirement..." to the Nuclear Weapons Council.

independently prioritize its requirements or make trade-offs within a portfolio management framework. Instead, they said that NNSA can only do so jointly with DOD.³²

We recognize that NNSA's requirements are derived from DOD's decisions while informed by NNSA's own capacity. Nevertheless, we continue to believe that by assessing its portfolio of modernization programs in future versions of the *SSMP*, NNSA could help congressional and agency decision-makers better understand its priorities and potential future trade-offs. This effort could be conducted in coordination with DOD and would be particularly important if DOE again found that the FYNSP was insufficient to achieve program requirements. As we stated in March 2020, NNSA's weapon modernization activities have significant interdependencies. Portfolio management best practices developed by the Project Management Institute state that organizations can optimize their portfolios of programs and projects by assessing their capability and capacity to finance specific portfolio components; determining which portfolio components should receive the highest priority; and identifying components to be suspended, reprioritized, or terminated.

NNSA officials told us that they are moving toward greater transparency regarding potential tradeoffs in future *SSMPs*. However, they also stated that the *SSMP* is one of many mechanisms for providing affordability information to decision makers and is not the most appropriate place for communicating some details.³³ We are separately reviewing NNSA's portfolio management approach under a provision of the Senate report accompanying the National Defense Authorization Act for Fiscal Year 2020.³⁴

Implications of Potential New START Expiration for Weapon Modernization Activities

What is New START and how does it inform NNSA's modernization plans?

New START is a treaty between the United States and Russia for the reduction and limitation of strategic offensive arms. Upon its entry into force on February 5, 2011, the treaty gave Russia and the United States 7 years to reduce their quantities of deployed strategic delivery vehicles, nuclear warheads on deployed strategic delivery vehicles, and deployed and non-deployed launchers and heavy bombers. The United States met these requirements by August 4, 2017,³⁵ and DOD has limited its strategic force structure consistent with these requirements. In addition, NNSA plans its modernization efforts to meet requirements that stem from DOD's force structure. New START will expire in February 2021 unless both parties agree to extend it for no more than 5 years.

³²We recently reported on an example of when DOD and NNSA have discussed trade-offs related to the schedule for an NNSA modernization program. See GAO, *Nuclear Weapons: Actions Needed to Address the W80-4 Warhead Program's Schedule Constraints*, [GAO-20-429](#) (Washington, D.C.: July 24, 2020). Specifically, we reported that when presented by NNSA with trade-offs to enable maintaining the schedule for an early production milestone, DOD officials told us they were willing to consider trade-offs while NNSA officials told us DOD held firm on the schedule.

³³NNSA stated that other mechanisms for communicating information on affordability tradeoffs within its portfolio include congressional briefings, questions for the record, budget briefs, and through Nuclear Weapon Council processes and proceedings, among others.

³⁴S. Rep. No. 116-48, at 389 (2019).

³⁵As of August 4, 2017, the United States met the New START Article II central limits for deployed ICBMs, SLBMs, and heavy bombers, warheads on deployed ICBMs, SLBMs and counted-for deployed heavy bombers, and deployed and non-deployed launchers of ICBMs and SLBMs and heavy bombers.

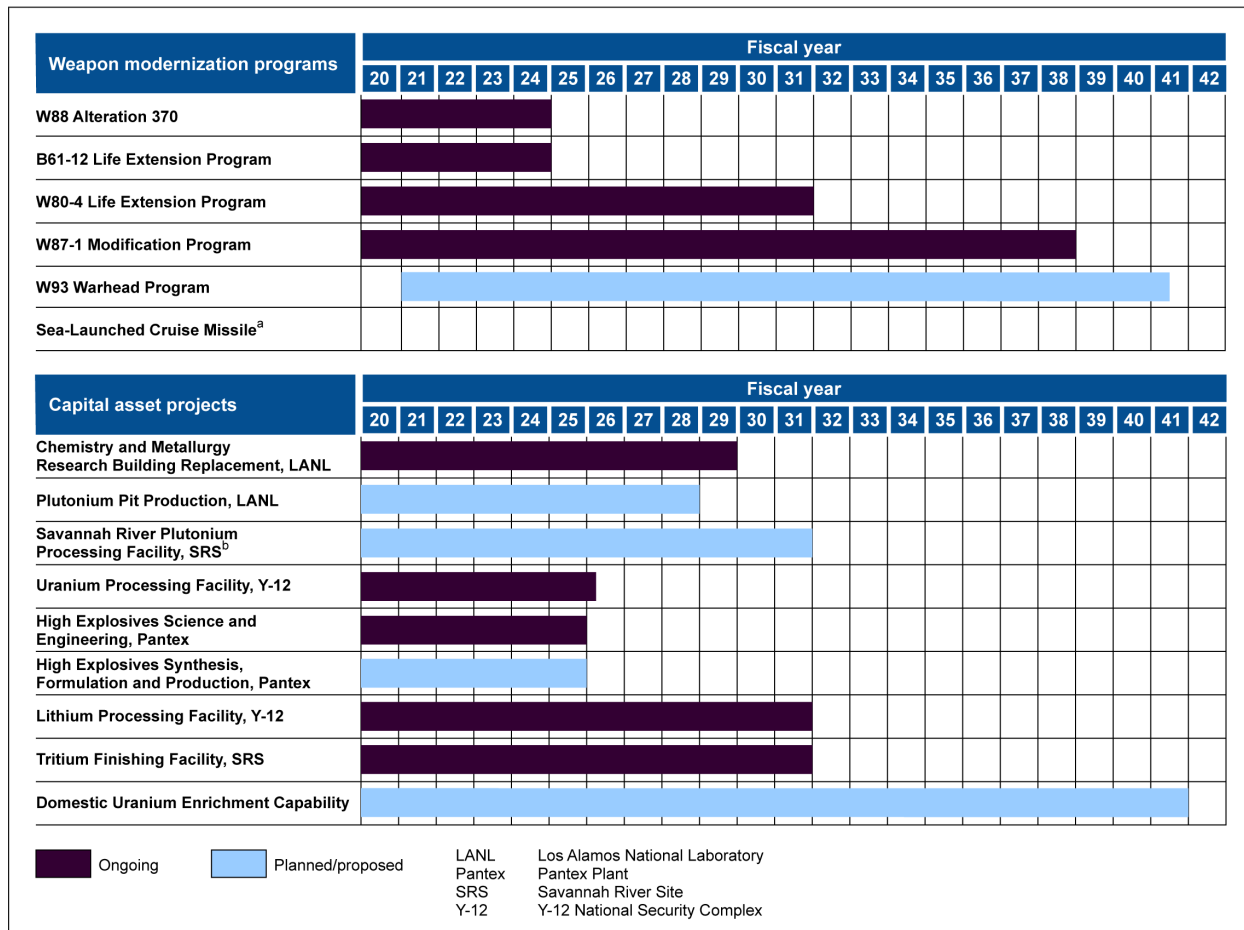
How could the potential expiration of New START in February 2021 affect the assumptions in NNSA's fiscal year 2021 budget materials related to future-years funding projections?

According to NNSA officials, NNSA has not yet considered the implications of the potential expiration of New START on the assumptions underlying its overall program of record and the program's future-years funding projections as described in the fiscal year 2021 budget justification. They said that the FYNSP is driven by current requirements as determined by DOD and does not account for other scenarios such as the potential expiration of New START.³⁶ Moreover, as shown in figure 2, NNSA's schedule for its modernization efforts—including ongoing and planned weapon modernization programs and related capital asset (infrastructure) projects—does not leave the agency with the capacity to implement additional weapons programs beyond the current program of record until the 2030s. According to DOD officials, DOD is basing its plans on the assumption that New START will be extended, and it currently has no plans to change its existing force structure.³⁷

³⁶U.S. Department of State and DOD officials have also stated that current modernization efforts are built on the assumption that New START will remain in place and are focused on replacing existing systems, and thus would not increase the size of the current stockpile beyond the current New START limits.

³⁷DOD officials said that they planned to issue a report in June 2020 pursuant to section 1237 of the National Defense Authorization Act for Fiscal Year 2020 that includes an assessment of the manner and extent to which the United States nuclear force structure could change if the New START Treaty expires in 2021, including current and planned nuclear modernization programs and associated costs, in consultation with the Secretary of Energy. However, these officials said that the assessment they are conducting pursuant to this requirement is not part of their budget planning.

Figure 2: National Nuclear Security Administration’s Schedule for Selected Modernization Efforts



Source: GAO analysis of Department of Energy and National Nuclear Security Administration, *Fiscal Year 2020 Stockpile Stewardship and Management Plan*. | GAO-20-573R

^aSchedule information is not yet available for a warhead associated with the sea-launched cruise missile, which is currently under study by the Department of Defense.

^bNNSA’s fiscal year 2021 congressional budget justification provides a date range of fiscal years 2026 through 2031 for the start of operations, which will be updated as planning and design progress.

Agency Comments

We provided a draft of this report to DOE and DOD for review and comment. DOE provided technical comments, which we incorporated as appropriate. DOD did not have any comments.

We are sending copies of this report to the appropriate congressional committees and members, the Secretary of Energy, the Secretary of Defense, and other interested parties. In addition, the report is available at no charge on the GAO website at <http://www.gao.gov>. If you and your staff have any questions concerning this report, please contact me at (202) 512-3841, or bawdena@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Major contributors to this report were

Jason Holliday (Assistant Director), Alisa Beyninson (Analyst in Charge), Antoinette Capaccio, Tara Congdon, Pamela Davidson, Penney Harwell-Caramia, Alan Smith, and Sara Sullivan.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Allison Bawden". The signature is fluid and cursive, with the first name "Allison" written in a larger, more prominent script than the last name "Bawden".

Allison Bawden
Director, Natural Resources and Environment

(104173)

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